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EDITORIAL NOTES.

Gas Coal Contracts.

THERE was a further deputation to the President of the Board of Trade last Wednesday. This time it was from the Manchester district, being the result of the recent conference of representatives of municipal gas undertakings that was held on the invitation of Mr. Alderman Kay, the Chairman of the Manchester Corporation Gas Committee, and Mr. Alderman J. S. Phillips, the Chairman of the Salford Corporation Gas Committee. Unfortunately (as will be seen from the note on the subject elsewhere), Mr. Runciman at the hour of the appointment was compelled to be in the House. But the Parliamentary Secretary to the Board of Trade (Mr. J. M. Robertson, M.P.) received the deputation, and gave a most attentive hearing to the spokesmen, whose representations he promised to faithfully convey to the President. There appears to be a feeling on the part of those of the deputations with whom we have come in contact that there is good hope of the Government making some really effective movement in the matter of speeding-up the distribution of coal, which there is no question is at the root of the trouble. We rather think, too, that both shipowners and colliery owners, who have, with few exceptions, been making the most of the present conditions, see that the Government cannot much longer delay some definite action in view of the pressure of large representative coal consumers, as well as of the public through their local bodies. Last week freights from the Tyne were easier; but Friday's quotation of 10s. 6d. was about double what it should be, including the additional charges due to the war.

Speaking at the Southern Association meeting on Thursday, Mr. Edward Allen appeared to be quite sanguine that, in regard to the matters that had been laid before Mr. Runciman, the Government would do something to produce measures of relief. He suggested the stoppage of the export of coal among other things. While the country is famishing for coal in some parts, living from hand to mouth in others, running reserves down everywhere to narrow margins which mean jeopardy to public services and industry, and paying dearly for it on all hands, it seems to us that it is carrying folly to the extreme to allow the departure from our shores of material that is wanted so urgently at home. And the export of coal just now assists in advancing and maintaining home prices! Contracts at home are far from being fulfilled according to schedule quantities; and they ought surely to be complied with—it certainly seems to be the rational order of things—before contracts for coal abroad. Many home concerns that have been unable to get sufficient coal delivered under their contracts have had to buy it in the open market at heavy prices; and, if it were possible to trace out coal from pit to purchaser, in all probability it would be found that some of these concerns have been buying the very coal that should have been delivered to them under contract at lower prices. The heavy-profit schemers and hunters among the coal people are making a rod for their own backs. They have been working, and are working now, in the best possible manner to bring about that regulation which they do not want, but which has been advocated more than once and in different influential quarters. Whatever happens in this way in the future, they will only have themselves to thank for it. There is the question of the upward flights of prices on the shallowest of pretexts; there is also the question of the relation of home supplies with exports. If the colliery owners cannot properly supply all the home demands, then they have nothing that they can spare for customers overseas. Yet we find that though the export business has receded considerably—by 2,189,714 tons last month, to add to the figures for the previous war months published on Feb. 16 (p. 371)—the quantities exported are still very large; and we could well do with those millions of tons at home. The value of the tonnage decrease in exports last month was £1,506,963. Referring to this, one critic says: "Unlike our experience at home, the cost to foreign "purchasers of coal has apparently undergone little or no "change, for the percentage decrease in quantity and value "is very nearly the same." Whenever trouble is being experienced at home over coal supply and delivery, it is always noticeable that the export business gets preferential consideration.

Mr. Allen, on the same occasion, made another suggestion; and it was that gas managements should not be in a hurry to enter into new contracts for coal. Circumstances are such at the moment that the colliery people can arbitrarily command practically any prices they like—prices that by their size unblushingly avow themselves the product of a desire to reap as big a harvest as possible from the exceptional conditions produced by an unparalleled war. It is Mr. Allen's opinion—we think it is well founded, although hesitating to strongly counsel one way or the other—that things will shortly settle down to an easier state in regard to coal prices, and that colliery owners will then find themselves in a position to come to the gas undertakings with their offers, instead of the gas undertakings going to them seeking offers. At any rate, it would be the height of folly to have a general rush into contracts at the present time, although, be it said, some undertakings have been very fortunate in already making contracts at figures which show a reasonable advance on last year's prices. The Liverpool Gas Company are among these fortunate concerns. An advance must be expected. But gas managements will be foolish to agree to quotations that are unreasonable; and there are not many colliery owners who, while at the moment busily scheming to make the most out of the present conditions, are prepared—unless contracts are very tempting ones, and they do not wish to lose them—to submit rational offers for the next contract year.

Questionable Methods in Coke Trading.

TRADING supplied a large proportion of the subject-matter of the Presidential Address to the Southern Association of Mr. J. W. Auchterlonie, of Cambridge. It is a good current topic. It is one upon which much can be said from many points of view; and it is one to which can be directed all sorts of appropriate aphorism and ethical formulæ. It is one, too, that provides opportunity for the free application of the lash to this country, and for the saying of many polite things about German methods in producing efficiency in men and in constructing commercial organization—only to find that another side to the tale can be readily disclosed which largely discounts what has already been said. In dealing with coal supplies during the war, the President was naturally strongly averse to the unpatriotic men who are working strenuously, through excessive profit, in making fortunes out of the misfortunes of the country. These individuals deserve all the scorn and the reproach that can be heaped upon them, and so do a class of men in the gas industry itself who, with callous unconcern for all interests but their own, do their best to spoil the coke markets of other gas undertakings, and so assist materially in depreciating the coke situation generally for the industry, with the result that the revenue of the industry is adversely affected.

It is an old tale, and an old trouble. Mr. Auchterlonie has cause to feel very aggrieved. He has worked up his local coke market to a fairly good condition; but the Cambridge Gas-Works, like other works, experienced a growth in the girth of the coke heap for some time prior to the present coke boom. Then came the invasion of the Cambridge district by a Yorkshire gas undertaking, which necessitated the reduction of the Company's prices by 1s. 8d. per ton; while the railway and waggon hire that had to be paid by the market-depreciating undertaking to get its coke to Cambridge was no less than 8s. per ton! What was the good of

this senseless proceeding? The gas industry did not benefit in any way from it; but the Cambridge Gas Company lost considerably by it. The raiders cleared out some of their coke stock at a ridiculous net price. The only people who appear to have been genuine gainers were those who engaged in the transferring of the coke made in Yorkshire to Cambridge. "I am not," remarked the President, "a lover "of rings in industries; but it is a suicidal policy for com- "panies or industries to carry competition to such an extent "that there is no profit for their labour." Mr. Auchterlonie spoke moderately; had he spoken much more warmly, he would have been fully justified. No doubt the manager of the Yorkshire concern referred to had no more care, so long as he could relieve himself of a part of his coke stock, as to what happened to the Cambridge Gas Company in consequence of his action, than some of the German submarine commanders have as to what happens to those unfortunates aboard unarmed mercantile vessels which their barbarous methods of warfare send to the bottom of the sea. "Necessity knows no law" is cited in defence of nefarious practices. But the freebooter's plea cannot be accepted as a valid excuse for underselling and spoiling markets in the manner described by the President.

The Yorkshire undertaking to which he was alluding is not known to us. But the question arises, Why did not this gas undertaking liquidate some of its coke stock at low prices in districts nearer home, instead of going such a distance away? Is this one effect of the Commercial Sections? Are the principles attaching to the members of these sections, and the loyalty which there is tacit understanding shall be exercised the one towards the other, bound by the same geographical lines that divide one Commercial Section from another? It seems very much like it, assuming the undertaking in question is a member of a Commercial Section. However, if it is so, then the man who has accumulated a heavy stock of coke must perforce, if on dumping intent at low prices, carry out the operation beyond the territorial confines of his own particular Commercial Section, which probably, as in this instance, means a considerable charge against the net price he will receive for the material. In these days, there is another highly uncomfortable aspect of this coke-price undercutting in other gas districts. Very special efforts are being made by some gas managements to develop the local domestic coke trade, and to bring coke into greater use for steam-raising and for other purposes. After a gas manager, in his own territory, has been doing good work in this way, and has obtained the reward of success, it is very disheartening indeed to have to share the reward with an undertaking that indulges in such raiding action as that of which Mr. Auchterlonie complains—probably an undertaking controlled by a manager who has taken no interest, and has not incurred an hour's anxiety, in trying to cultivate a larger home demand of his own. Those who make real effort to enlarge the home coke market are benefactors of the industry generally; and they ought to have their success protected by a sense of honour on the part of others. We must admit that coke markets and coke output are unevenly distributed, and there must be overlapping to an extent. One object of the data circulated by the Commercial Sections is to make the overlapping as small as possible, as between one gas undertaking and another. And when over-production is almost a universal condition, it is not playing the game to undercut the local prices of other undertakings —whether near or a distance away.

Internecine warfare is a thing to be avoided, if possible. But it seems there is nothing of an effective nature, except reprisals (which, as a rule, are expensive), that can be brought to bear against those men who have no consideration for others in getting rid of their own coke, at almost any price during periods of over-production, and so bring about disaster wherever they choose to conduct their operations. Of course, the most effective means of obviating this sort of thing, and of accomplishing something really valuable, would be by universal agreement; but the whole of the gas undertakings of the country never have been, nor ever will be, brought under any single agreement. They cannot all be registered in the Commercial Sections; and some of those who are do not make returns while enjoying the use of data collected from others. Nor can they all be brought into any one of the co-operative organizations of the gas industry. There is, therefore, little hope that the suggestion made by Mr. Auchterlonie—that a leaf should be taken out of the book of the cement manufacturers—will be adopted. At one time, there was underselling in cement, and there was great waste of money on long railway conveyance of the produce of the different works—so much so, that larger profits could have been made on lower prices under other circumstances. The cement makers entered into an agreement under which cement was drawn from works most conveniently situated to the place where it had to be delivered. In this way, considerable savings were effected on railway transit. Industrial economy such as this can be shared by producers and consumers alike.

One other interesting point bearing upon trading in coke is found in Mr. Auchterlonie's expression of opinion, based upon personal and local experience—that it is advisable for gas undertakings to deal as far as possible direct with the consumers of coke, instead of letting the trade fall into the hands of coal merchants. One means of doing this, he says, is to limit the discount allowed to the local retailers. At one time, at Cambridge, the Company raised the discount to them to 17½ per cent. (which was very generous); and there was an understanding that the merchants were not to sell at less than the advertised price. What happened? Customers who had been dealing direct with the gas-works began filling their requirements through the local retailers, and doing so at the expense to the gas-works of 17½ per cent.! The part that was played by the retailers in this instance was a breach of the honourable understanding arrived at; and there was no alternative but for the Company to withdraw the substantial concession they had made. It would have been better perhaps (unless the violation of the understanding was general) to have tried to trace the delinquents, and to have only withdrawn the discount from them, while continuing it in the case of those who were acting honourably. Other gas undertakings find the benefit of allowing to the local retailers a discount sufficient to induce them to cultivate business in coke. If they have no, or if they have insufficient, inducement, they will naturally do their best to always push the sale of coal and never that of coke; and yet their means of distribution and sale in small quantities are usually better than those of gas undertakings. Denial of a discount to the local retailers has sometimes its unpleasant side. We know a case where, through no discount being allowed off yard prices, coke has been obtained from another concern not far distant, and the retailers have been able to undersell the local concern. One fairly considerable coke contract in this area used to pass (it may do so now) through the hands of a local coal merchant; and he invariably imported the coke from a works at which he was allowed a sufficient rebate from yard prices. Local circumstances must control action in this matter; but so long as an understanding is honourably complied with, the best policy, generally speaking, is to have the local retailers for rather than against one.

Other commercial topics are to be found in the address, together with comments on several matters of distinct character which are also of immediate concern. They take us over much ground, and one or two tempt further comment. But the line must be drawn here, with a word of compliment to the President for the extent of the very interesting matter that he brought together in his deliverance.

Illegal Electricity Charges—Possible Developments.

The full measure of the straightening-out of the crooked paths of electrical charging that has been wrought by the Long Eaton judgment will very probably never be exactly known, because so many electricity administrations have since quietly suppressed the practice of illegal preference, which, it was acknowledged during the Long Eaton proceedings, was "well-established, and was general all over "the country by reason of the competition of the gas under- "takings." Although the number of secret conversions from wrong to legitimate doing will remain unknown, we should like to have more evidence that gas companies in competition with municipal electricity supplies are doing what their own interests demand of them, which is to have the electrical tariffs in vogue in their districts thoroughly examined and overhauled by some competent person, and if any are found to be framed on lines that give preference, and which preference is prejudicial to fair and open competition with the private gas enterprise, to take the requisite action—first of "peaceful persuasion" and then, if, unfortunately, this fails, something of a more active kind—to have the charges brought within the lines of propriety as laid down by the Legislature. Unless this is done—so long as there is a single electricity undertaking allowing any

preferential terms—the full value of the Long Eaton decision will not have been realized.

This decision, the circumstances which led to the Long Eaton Gas Company (long-sufferers from the unjust competition of a District Council) taking action upon a coercive measure on the part of the Council against gas consumers who were also electricity consumers, the arguments advanced in Court by the Council, and which arguments were so brittle that they snapped quickly under the weight of facts brought to bear upon them, were made the subject of an interesting communication by Mr. George Stevenson to the Midland Association last Thursday. As Engineer and Manager of the Long Eaton Company, Mr. Stevenson has had to stand the brunt of carrying on a gas business against a Council whose competitive business policy has not had lustre added to it by these legal proceedings, nor by the contempt heaped upon it by the manner of the dismissal by the Court of Appeal of the plea of the Council for a revision of the judgment of the Court below. Mr. Stevenson, too, was the originating spirit in the action that brought about the litigation that has had the only ending that it possibly could have if sections 19 and 20 of the Electric Lighting Act, 1882, meant what they said, and were intended to be effective in the conduct of the electricity supply business. Now he adds to the indebtedness of the gas industry by presenting to it this modestiy prepared statement, which gives the whole tale in crisp sentences and in narrow compass. It is a useful statement and commentary, put forward without bitterness or resentment. Among its useful ends ought to be that of convincing of their own folly those electrical critics (not all journalists) who indulged in cheap sneers at the gas industry over a supposed perturbation—the case was taken to be a sign of this—owing to the progress of the electrical industry, and accused it of unfair motives in the matter, which sneers and accusation are given their right proportions when the object of preferential charges is properly considered, and the judgment of the Court of Appeal is given its due weight.

As Mr. Stevenson says, the case was not an attack on municipal trading *per se*, but on methods. And it is from the arbitrary methods of some municipal electrical traders that private gas enterprise suffers so severely. As a matter of fact, not even in the competition between privately owned omnibuses and municipal tramways is there any parallel to the severe conditions that have to be met by private gas enterprise competing with municipal electricity. If the latter is unsuccessful, the gas company, being large ratepayers, have to pay towards the support of their business rival. No support is accorded to private gas enterprise if it fails to make both ends meet; it has to get out of its difficulties by more judicious management. It is highly assessed for rating purposes; the electricity concern often is not. Public lighting and the illumination of public establishments are taken from the gas company without competition, and handed over to the electricity department, which has friends at every court, owing to the interworkings of local government and membership on other bodies of the units of the electricity committee. When on top of all this come preferential charging and the devising of tariffs and making of concessions that are not consistent with the governing Acts, then it is time for the gas industry to do what it can to cause the competition to be brought on to straight lines. The electrical industry has no right to preferential methods over the gas industry, which is only permitted to allow discounts and rebates "of equal amount, under like circum-"stances, to all consumers." Gas undertakings have a right, and it is their duty, to see that municipal electrical competition is conducted on legitimate lines. That the duty cannot be performed to the full extent is due to an omission of Parliament in not providing efficient means for insisting upon secret contracts being divulged, under which, there is no doubt, a considerable amount of preferential charging is continually going on.

The Long Eaton and Ilford cases are promising to produce interesting sequels. In his paper, Mr. Stevenson hints at the action of the Council in making preferential charges bringing in its train litigation for damages and for the recovery of wrongful charges. He remarks: "The Council "have now withdrawn and revised their charges; but, even "so, the Gas Company ought to have a right to damages "for custom they have illegally lost, and also consumers "who have been wrongfully charged should have a just "claim for reimbursement. *These matters are now receiving "attention.*" In the Ilford case, in regard to expenditure illegally made and incurred through the Council acting *ultra vires*, the Local Government Board are considering the question of surcharging the councillors. As the Ilford Council also admitted preferential charging, perhaps the same questions are being considered as in the case of Long Eaton. There is no wish to be vindictive; but justice is justice. If through the illegal practices of the Councils, damage has been occasioned to either Gas Company, they deserve to recover. The same with those customers who have been wrongfully charged in excess of those to whom preference was given; they have a right to have the excess refunded to them.

High-Pressure Gas and Lighting Topics.

With darkened streets at nightfall, through the reduction of public lighting, the suppression of outside shop lights, and the minimizing of shop window interior illumination, there does not seem much to hearten purveyors of the necessary primary agents to consider matters affecting illumination. It would, however, be a grave mistake to give way to this feeling, and to decline to recognize that outdoor lighting is only a comparatively small field, and not the most profitable, of the business of the lighting industries. Domestic lighting and factory lighting are very important components of that business. There has been a very large amount of criticism of the artificial illumination of factories and workshops; and a proved inefficiency in such illumination has been more striking than a proved efficiency. Home Office reports have made unpleasant but useful disclosure; and when we have before us the report of the Departmental Committee who are specially considering this matter, it will be found they have had presented to them much evidence that there is room for extensive improvement. Recent years have witnessed a certain amount of betterment; but there is an insufficient recognition yet that lighting in factories is something that ought not to be carried out in a haphazard sort of way. The day has passed when the gas industry can afford to neglect the study and practice of systematic and scientific illumination. Good lighting to the factory owner means an increased output, the prevention of accidents, and, if a correct selection is made of lamps and fittings, a saving of eyesight, and an enhanced facility in judging colours. There is much work to be done in this direction, in first educating the factory owner up to certain salient truths, and in afterwards establishing these truths through improved illumination. Now is the time for tackling this work, and in no half-hearted manner. The time is also opportune, now that spring is upon us, to advise upon the improvement of indoor lighting generally.

Last week two very helpful papers bearing upon this matter of interior work were read at Association meetings, and both in Birmingham. The first was by Messrs. V. H. Mackinney and E. Stroud on the distribution of light. It was contributed to the meeting of the Midland Association on Thursday. The second was by Mr. R. G. Marsh on private gas-compressing installations. This was read on Saturday before the Midland Juniors. The latter paper was not confined to compressing-plants for illumination, but extended to plants for providing high-pressure gas for furnace and other manufacturing processes. It is a great mistake to suppose that, in connection with self-contained high-pressure plants, such standardization has been reached that all one has to do in making installation is to go to work on stereotyped lines. To do this is to court disaster both in respect of economy and efficiency. It is one of the points of Mr. Marsh's paper, that, while the main parts of the plant for an installation have arrived at standard lines, there must be a complete study of the details of every case in order that the maximum economy, efficiency, and satisfaction may be realized. No one would put in a rotary compressor, which is the best possible thing for lighting installations, if a pressure of (say) 12 to 13 lbs. per square inch is required for furnaces, and other manufacturing purposes. A reciprocating machine is then the proper thing. But outside the compressor there are several points that demand very careful attention, in order to ensure success. Mr. Marsh's communication puts one in possession of a number of such points where, in the Birmingham experience, there has been trouble, and means have been found to avert them in future. It is one of the advantages of high-pressure gas installations that, though trouble of somewhat serious nature is easily brought about through insufficient regard to detail, the trouble can be just as easily avoided, and by very simple means.

Take, for instance, the difficulty frequently experienced through the oscillation of low-pressure supplies in the neigh-

bourhood of compressing-machines. Though some makers do not consider anti-fluctuators are necessary, they have, in many cases, been found imperative; and a very simple form is all that is required. It does not follow, however, that an anti-fluctuator is always essential; it depends wholly upon local conditions. But this is just one point which shows that, in making an installation of compressing-plant, it is requisite to pay attention not only to the high-pressure customer, but to the low-pressure neighbour. In connection with the plant itself, the author of the paper puts his finger on several points upon which a sharp eye must be kept both in designing an installation and in its subsequent running. Just by way of example, provision should be made for economizing driving power according to load. Mr. Marsh gives information as to how to do it. There is, too, the rather serious trouble which arises from the building-up of pressure on the low-pressure side when a machine has been stopped. There, again, the means of overcoming this are described. Then, in starting and stopping high-pressure plants, there are right ways and wrong ways of proceeding; and the wrong ways are capable of producing a great deal of unnecessary trouble. Among much else, the importance of proper lubrication is insisted upon; and, in this connection, there is good reason in certain experience for giving emphasis to Mr. Marsh's point that the quality of the lubricant is not by any means a negligible factor.

Passing from high-pressure installations to the question of illumination generally, the application of proper principles will produce good results. Certain of these principles are brought out in the paper by Messrs. Mackinney and Stroud. The point need not be laboured that as much study should be devoted to realizing the maximum advantages from artificial lighting as from natural lighting. There is no excuse to-day for not obtaining a proper and predetermined distribution of light in all circumstances and for all purposes. What constitutes good lighting? ask the authors. They describe it as being a sufficiency, both local and general, for given purposes—there must not be too little for the efficient performance of work, and the protection of eyesight; and there must not be too much if waste is to be prevented. The light, too, should be directed by suitable accessories to just where it is needed. There is one thing the authors omitted in replying to the question as to what constitutes good lighting? That is the quality of the light. The light should be of good composition; and the light source of not too high an intrinsic brilliancy. It is true that, whatever be the light source, prismatic glassware—of the Holophane type—comes in an easy first in securing proper distribution, and in obtaining good decorative effect; and such glassware "damps down" the defects of sources of lights of high intrinsic brilliancy, and partly annihilates certain of the defects in light composition. But the authors must admit that gas-mantles have a lower intrinsic brilliancy than metallic filament electric lamps, and that inverted gas-lamps—their own polar curves show this—have an advantage over metallic filament lamps and upright gas-burners for interior lighting, in that they give the best possible downward distribution of light for any purpose. Therefore, with such lights, there is not so much work required by accessories in nullifying light defects as there is in the case of lamps the characteristics of which are of the contrary order. All the same, there is an advantage even with inverted gas-burners in securing a good distribution of light; and prismatic glassware enables this to be done. For decorative effect *plus* distribution we do not know anything superior to the prismatic glass bowl with an inverted gas-burner fixed in the open above it. It certainly offers great flexibility in producing improvement of existing installations, and in obtaining the maximum working efficiency of the light source. The table at the end of the paper, showing the foot-candle intensities required for different places and for different purposes, will be very useful to those concerned in carrying out lighting installations.

"War" Advances in the Price of Gas.

The early hope that a small increase in the price of gas would enable gas undertakings to tide over the difficulties created by the war is not going to be fulfilled in the case of many concerns a distance from the coal-fields. It is a pity; but it cannot be helped. When "war" advances in the price of gas were originally made, the whole position had not developed; and no one could then have foreseen what was going to happen in regard to coal prices, freightages, delays on railways, forced coal purchases in the open market at high prices, and the extra cost incurred by working from stock. The development of conditions and the accumulation of effects have necessitated an addition of 4d. to the price charged by the Gas Light and Coke Company—making an advance of 6d. since the war began, and raising the price to 3s. It would, of course, have been better had it been possible to estimate at the outset what would be the total contribution required from consumers towards the extra costs of supplying them with gas. But it was not possible; and it is the deep regret of the Directors that circumstances now necessitate a further demand on the consumers. Those concerns that have not yet increased their price, but will have to do so, will now be able to make a fair estimate of the total amount that will be needed from the consumers. This will be better than making advances by steps, as consumers will the better realize that it is a special "war" advance, and not the product of ordinary adverse trading circumstances; also that, being special to the war, there will be recession to the old prices at as early a period as possible. In the case of sliding-scale companies, it will be well to let the consumers know that the shareholders will also seriously suffer from these advances, as will also co-partnership employees. There were newspaper statements in circulation on Sunday and yesterday that the South Metropolitan Gas Company had likewise advanced their price. The reports were unauthorized; but it is possible they were the shadows of an immediately forthcoming event.

Sheffield Gas Company's Work Last Year.

The Chairman of the Sheffield Gas Company, Mr. Wilson Mappin, had to tell the shareholders at the annual meeting last week much the same story as other chairmen have lately been telling, as shown by the reports which have appeared in our columns. Dearer raw material, higher wages, and reduced returns from residuals owing to the war, necessitated the withdrawal of £34,735 from the amount brought forward in order to pay the usual dividend. However, the Directors were able last August to make contracts for coal at lower prices; so that the accounts showed a decrease of £9719 on this item as compared with 1913. A gratifying feature of the year's work was the maintenance of the price of gas at the low figure of 1s. 1·3d. per 1000 cubic feet; gas being, as the Chairman remarked, the only commodity which had not risen in price during recent years. How far this happy state of things will continue, in view of present circumstances, it is, of course, impossible to foresee. The use of gas for metallurgical work, as "JOURNAL" readers are aware, is greatly encouraged and facilitated by the Sheffield Gas Company; and a number of additional furnaces, requiring large meters, were put in last year. In this connection, reference was made by the Chairman to the Company's show-room, and also to the exhibition recently held by Messrs. Brayshaw, accounts of which have appeared in our columns. As in the case of other gas companies, many of the employees have answered their country's call, and joined the Army; and the Directors have made due provision for their dependants. This brief notice of the meeting may well conclude with a repetition of the Chairman's expression of the hope that on the next occasion the shareholders may assemble under happier auspices.

A Coke Business-Making Opportunity.

We are having one of the dullest winters ever experienced, and a winter with characteristics all its own; and it is welcome to the retention of the peculiarity. Coke production is easing-off; but the demand is at high-water mark. There is, in consequence, a temptation on the part of some gas undertakings to put up prices to high figures. The very best advice that can be given them is "Don't." A reasonable price, and not a war price, is the proper thing under these circumstances. Mr. Edward Allen referred to the matter, in a speech towards the end of the proceedings at the meeting of the Southern District Association last Thursday. He knows of one municipal gas committee whose coke policy has been a disastrous one to both the undertaking and its neighbours; and now they are engaged in killing their own future market by asking prices in excess of what are regarded in the district as reasonable. Looking at the matter from the politic point of view, this is not an opportunity for making excessive profits out of coke,

but an opportunity for making permanent customers. There will be next winter, with its heavier coke production; there will be an "after the war." We have to remember the coke-heaps prior to the war; their size after the war will be affected by present policy. Of such an opportunity as the present for permanently benefiting the coke market, no gas manager could ever have dreamed. Mr. Allen had at hand an illustration in the shape of an inquiry for a price for 100 tons of coke a week over twelve months, and this coke is required by a single customer to take the place of coal. Mr. Allen has no intention of dismissing the inquiry finally from his mind until a contract is signed, sealed, and delivered. The twelve months may extend to years. Who knows? It largely depends on how the matter is handled now.

"Commandeering" Workshops and Men.

We have all to suffer some kind of inconvenience, discomfort, and sacrifice in connection with the war; and, in the great emergency, it is not at all unlikely that the big engineering workshops and foundries associated with the gas industry will be called upon to take an increasing part in the provision of munitions of war. Some of them have already been engaged in this direction; and they may be commanded to do more in the immediate future. Probably additional ones will also have to divert attention, machinery, and staffs from normal to abnormal production. Gas-works, in increasing number, are being requested to provide toluol, and are willingly rendering all the help they can. It has to be recognized by all that it is imperative that this country must, through its circumstances, do a very large part in the provision of munitions of war—not only for its own Army and Navy, but for those of its Allies; and the output has to be largely increased. In the circumstances, it is well to make timely reference to the relations between our manufacturers and their customers of the gas-supply industry. It may be that there will be some temporary (if not prolonged) interference with the work of the manufacturers of gas plant and gas-using appliances. Of this nothing definite can yet be said.

Extensive Powers.

But the Defence of the Realm (Amendment) No. 2 Bill recently introduced gives the Admiralty and the Army Council plenary powers in regard to the diversion of factories and workshops—plant and labour—from their ordinary work to any work which they may require to be done. They had powers under sub-section 3 of section 1 of the Defence of the Realm Consolidation Act of last year to take possession and use certain factories or workshops or the plant; but the enlarged powers are to apply to "any factory or workshop of whatever sort, or the plant thereof." They will now also be able to require any work in any factory or workshop to be done with the object of making the plant or labour therein as useful as possible for the production of war material. Not only this, but they may "regulate or restrict the carrying on of work in any factory or workshop, or remove the plant therefrom, with a view of increasing the production of war materials in other factories or workshops." Of course, this interference may involve the non-fulfilment of contracts; but there will be no ground of action against any firm who are unable to complete contracts within time through any action of the Admiralty or War Council. There is another point. In the gas industry such an excellent current of friendship now runs among the manufacturers that there will be a general willingness to as far as possible help through with contracts that are blocked through any "commandeering" of works and men. There is talk of compensation for interruption of ordinary work. There would be some difficulty in assessing damage incurred through any inability to enter into new contracts; and present inability in this direction may in the future have far-reaching effects upon a firm. However, country first, and everyone for "Victory."

British Dyes Limited.

The prospectus of the Company that is being promoted under the *ægis* of the Government for providing dyes and colours, and keeping afloat industries that have been largely dependent upon Germany, has been issued. The list of applications for the capital closed on Friday; but the result is not yet known. Applications for shares were particularly invited from users of dyes and colours and from others willing to assist in providing the supply. To the meeting of the wants of the shareholding users, the Company's work is to be primarily directed, subject to an agreement to take their productions now and for five years after the war, conditional on supplies being of good quality and suitable to purpose. The details of the financial part of the scheme are now well known. The directorate is to be composed of nine members; Sir Mark Oldroyd being the Chairman. Two of the members are Government representatives; and they will continue to hold office so long as part of the loan by the Government is outstanding. In addition to their ordinary votes, the Government Directors are to have absolute power to veto any proposal or resolution of the Board which shall, in their opinion, tend to encroach unduly on the trade or business of any British manufacturer of products other than dyes or colours, or to give any undue preference to individual customers of the Company, "provided always that such veto shall not be used in such manner as to prevent the manufacture or rendering marketable of products incidental to the manufacture of dyes or colours, or to prevent priority of supply for shareholders."

Constitution of the Board.

It is proposed that the first work of the Directors shall be to proceed with the negotiations for the purchase of Read Holliday and Son's works and other factories, and to arrange for supplies from Switzerland. There are points in, and omissions from, the prospectus that under ordinary circumstances would be open to criticism; but really the only real criticism that has been levelled against it has been that there is no chemist on the Board. Sir William Ramsay has written to "The Times" pointing out how most of the large successful chemical manufacturing concerns have had qualified chemists at their head; and Sir Henry E. Roscoe has written to the same paper urging the importance of the Company investing in science for the discovery of new colours. It seems the dye users have selected practically the whole of the Board; and they have an objection to a scientific man as a colleague, as they fear his presence would tie their hands. With their practical knowledge of the business, and with the employment of chemists, in their opinion the Company's operations are fully safeguarded. However, there is no obstacle to the Board co-opting as a Director a scientist with special knowledge of the dye and colour industry. This being so, we may yet see such a man on the Board.

Gas Profits and the Rates.

These are not days in which the taxpayer can be expected to regard with equanimity—even if he would at any time do so—the announcement of a record increase of his rates. On reflection, he will, of course, perceive that, with almost everything else "going up," there is nothing unreasonable in the rates following suit; but for the increase to be of such an extent as to earn the description of "a record," is a serious matter, with so many other abnormal calls upon his pocket. Yet this is the case with the rates for the ensuing financial year at Warrington, which it has been found necessary to raise, by no less a figure than 1s. 4d. in the pound, to 9s. 4d. Such consolation as may be so derivable might be taken from the thought that there are other places where still higher rates are levied; but this—if it occurred to them—was not deemed sufficient explanation by the councillors, and is hardly likely to be so by the citizens. The meeting of the Council at which the "budget" was considered was a long one; and while on the one side charges of reckless extravagance were made, on the other it was urged that the greatest possible care was being taken of the ratepayers' money.

An Argument Illustrated.

The debate at Warrington, among other things, illustrates one more argument against the regarding of municipal trading concerns largely as rate-aiding undertakings. For the past three years, the gas profits in the town have averaged over £13,000 per annum; but for this year the contribution to the rates is expected to be only £4000. This, and the higher cost of education, are said to be the "dominating influences" in connection with the increased rates. Deprived of a large portion of their gas profits by the advent of less favourable times, the Council are driven to raise more money by direct taxation; and there arises dissatisfaction which would not have been felt had there never been large transfers of profits. Some members urged

that the price of gas should be raised; one councillor even remarking that low rates to a town like Warrington are much more important than cheap gas. But really the arguments adduced during the discussion in favour of gas being supplied at as low a rate as practicable, seem to be unanswerable. For example, is it not correct to say that to supply commodities at the cheapest possible prices is the only equitable way in municipal government? As one member said [though he was not arguing altogether from the standpoint taken here], "none of the great limited companies have to pay off their capital by a series of fixed annual instalments; but the Corporation are obliged to do this before contributions in relief of rates can be made." Should municipal gas consumers, then, be required to pay a portion of the rates of non-consumers, besides having to pay off the capital of an undertaking which is supposed to belong to the ratepayers?

THE GAS INDUSTRY AND THE WAR.

The Local Government Board have circulated to local authorities a memorandum regarding the organization of labour, in which they say they have received a communication from the Committee of Imperial Defence, who have had under consideration the necessity of securing the best organization of the labour force of the country in the existing circumstances. In view of the needs of recruiting and of the demand for labour for the manufacture of war materials and for the production and transport of the necessary supplies for the population, the Committee emphasized the importance of releasing male labour of high physical quality so far as possible from other occupations, and of substituting, where necessary, men of more advanced years, or (where the conditions allowed) women workers. The Board say they are aware that local authorities generally have done much to facilitate the enlistment of those of their employees who are eligible for military service and who can be spared; and they are far from suggesting that normal staffs should be depleted to such a degree that the services for which local authorities are responsible could no longer be carried on with efficiency. But at a time when the vital interests of the country imperatively require that as many fit men as possible should be added to the army, when the manufacture of munitions of war is at all hampered by lack of labour, and when the same cause gives rise to difficulties in the supply and transport of food, fuel, and other necessaries—difficulties which have largely contributed to the recent increase in prices—the Government are compelled to remind local authorities of the importance of making adequate arrangements for utilizing to the best advantage the available supply of labour. They urge that only men who are indispensable for the work of local authority should be refused permission to enlist; that artisans who belong to trades needed in arsenals, dockyards, and armament factories should, wherever possible, be released and encouraged to find employment there; and that where there is a demand for labourers on the railways, in docks, and on farms, &c., the local authorities should facilitate the transfer to those employments of any men who can be spared and can there find suitable occupation and remuneration. In pursuance of this policy, it will be necessary to economize labour to the greatest extent possible; and, where substitutes are needed, to engage only men who are not eligible for the army, and not suited for occupations to which labour should be transferred. There are some posts in which the employment, temporarily, of women in place of men may be practicable. The Board are aware that the policy which, in accordance with the conclusions of the Committee of Imperial Defence, they recommend may involve the employment by local authorities of less efficient labour, the postponement of many desirable works, and some public inconvenience; but they have no doubt that the difficulties will be faced, and inconvenience cheerfully borne, in view of the needs of the time and the gravity of the issues at stake.

As the result of inquiries, the "Manchester Courier" states that, contrary to what might have been expected, the limitation of the lighting of Manchester has left the total output of the Manchester Gas-Works practically unaffected. Though a smaller volume of gas was actually used in illuminating the thoroughfares of the city, more gas was disposed of for domestic and other purposes, with the result that the deficiency in the one was made up by the increase in the other. So far as electricity is concerned, no difference from fairly normal times has been noticed, as there are comparatively few electric street-lamps in the city, the bulk of the current, apart from that used for the tramcars, being furnished to industrial consumers, who have utilized their usual amount. In Salford, reduced lighting is having no effect on the amount of electricity used, owing to the fact that there has been no decrease in the number of lamps for illuminating purposes. The increased cost of fuel has been responsible for a number of firms introducing electric current into their works; and the tendency shows that a larger supply of electricity will be required in the near future. It is estimated that at least £200 will have been saved the Salford Lighting Department during the present quarter, as a result of the reduced lighting proclamation. Many of the street-lamps are unlighted; and as a consequence less gas is needed. The advance in the price of coal is also benefiting the Gas Department. There is a greater demand for gas-fires, and more people are adopting gas for cooking.

A correspondent whose duties take him into many of the towns and boroughs of Industrial Lancashire writes that most of the districts, last week, appeared to him to be suffering from the stringency of the military regulations regarding the lighting of street lamps. One or two gas officials with whom he conversed agreed that the present condition of things was very awkward; but they had no option but to obey the orders issued. The outskirts of some of the cities and large towns seemed to be particularly dismal, though as much light as possible appeared to be given to dangerous corners and similar situations. The Mayor of one borough said that he and the Town Clerk had the greatest difficulty in getting along one night; and the following day he spoke to the Chief Constable of Lancashire about the matter. That worthy, he said, regretted that curtailed lighting was imperative, and thought that it would have been better if the reduction of light could have been brought about more gradually, and as circumstances were found to demand it. A night ride in the train from (say) Manchester to Liverpool, Leeds, or Preston, is eloquent tribute to the way gas authorities generally have endeavoured to tackle the question of suppressed lighting.

Sergeant Charles Valon, of the Leicestershire Yeomanry, has unfortunately returned home from the front wounded, and is now at the Victoria Hospital, Netley. He was in a trench within fifty yards of the German trenches, when he was hit by a rifle bullet in the neck behind the ear; but it was evidently spent, as the wound itself is not serious. Unfortunately, however, the shock of the blow resulted in complete paralysis of the arms and legs. The doctors, we are glad to learn, say they have confidence that he will make a complete recovery; but it will take some time. He can now move his legs and hands a little, which is a hopeful sign. Mr. Valon, who was recently under Mr. Hubert Pooley at Leicester, had resigned his position there, to take up an appointment at the Bath Gas-Works, when the war broke out.

It is announced that Messrs. Willey and Co., of Exeter, have been approached with a view to ascertaining what they can make and what their resources are in connection with the Government scheme for commandeering industries necessary for providing equipment and munitions of war for the Army and Navy. The Company have about 180 men serving in His Majesty's Forces.

The Wandsworth Borough Council have complained to the Wandsworth, Wimbledon, and Epsom Gas Company regarding the quality of the gas supplied to customers, and have received a reply from the Secretary stating that the Directors feel satisfied that the Council cannot have any conception of the acute position in which the Company are placed with regard to getting materials for making gas, and are somewhat surprised, in view of this fact, that there has been no default such as might inflict penalties on the Company. The Directors' hoped that the Council would exercise some forbearance in these matters, so long as the crisis affecting the country lasts. The Council decided to receive the letter, and to make no order upon it.

Addressing the House of Commons on Monday of last week, Mr. James Hope, referring to the protection of the public utility services of London, said this protection was both personal and mechanical; and there were cases in which vital machinery might be so exposed that, while the back of the guard was turned for a moment, very grave injury might be done. There were also large and complicated premises all the approaches to which it was impossible for the eye of the sentry to cover. It was therefore absolutely necessary that there should be mechanical as well as personal protection. The great majority of owners had handsomely responded to suggestions to provide such protection; but others had not. The consequence was that in certain important instances the protection of the public services of London was not sufficiently assured. If the Home Secretary could not see his way to take action himself, the absolute necessity of something being done should be urged upon another Department. It was due to those owners who had done their duty that others should be brought into line. They had spent considerable sums of money; and it was not right that they should see other owners evading their responsibility, and calling for (and in some cases getting) military protection. It was also due to the special constabulary that this should be done. Much greater powers were taken under the Defence of the Realm Act. He had tried hard to get something done; and, having failed, he felt compelled to resign his position on the headquarters staff of the special constabulary. In the course of a lengthy explanation of the circumstances of the case, Mr. M'Kenna, in reply, said he did not feel justified in asking Parliament to give the police authorities the very strong powers for which Mr. Hope asked.

It was stated a fortnight ago that a Committee had been appointed by the Board of Trade to inquire into the causes of the rise in the retail price of coal sold for domestic use, especially to the poorer classes of consumers in London and other centres. On a visit of inspection to the various depôts in London, it was reported that they found large quantities of coal in railway yards, and in trucks on sidings.

TAR AND PITCH PRICES,

AS AFFECTED BY PRESENT WAR CONDITIONS.

THE correspondent, on whose report are given each week the prices in the section of "Current Sales of Gas Products" which is headed "Tar Products in the Provinces," sends the following communication as to the basis on which he proposes to in future deal with the tar and pitch question.

Several tar distillers and gas undertakings have requested that the price of tar inserted in the "JOURNAL" should, from now onwards, include the pitch portion of the tar; and as there is now a certain market for this article, it is probable that the insertion of such a price would in most cases be fair and just to both the gas undertaking and the tar distiller. But, owing to the abnormal state of affairs which has prevailed for some time past and is still prevailing, it is no longer possible to give one price alone for tar which could be taken as a fair basis for contracts for this article in all parts of England.

It is, of course, well known that the price which was put into the "JOURNAL" for tar was simply a basis upon which contracts for tar might be made. In each case the buyer and seller had to arrange the amount which was to be added to, or deducted from, the price in the "JOURNAL," for any particular tar—having regard to its quality and the carriage on its products to their natural market. Previous to the war, the differences in the price of products all over the country bore a fairly steady relation to the market prices existing at the big centres such as London, Glasgow, Hull, &c. But owing to the danger to shipping in the North Sea during the war, any vessels taking cargo from East Coast ports have demanded more money than from West Coast ports; while there has also been far greater difficulty in getting boats at all on the East Coast.

This difficulty existed more particularly at the ports north of London on the East Coast; and it reached a climax in the case of the Humber ports and those on the Norfolk and Suffolk coast. It is understood no pitch at all has been shipped from these places since the commencement of the war. In London, South Coast, and on the West Coast the difficulties have not been quite so great; and the prices bear approximately the same relation to one another as before the war.

It is, therefore, suggested that a price for the pitch portion of the tar from August to the end of February shall now be inserted for each month; and that from now onwards the full price of tar shall be inserted from week to week. But, where contracts have been made upon "JOURNAL" prices, which concern tar the natural outlet of whose products is from East Coast ports (other than London), special deductions shall be made from the price for tar given, so as to allow for the abnormal conditions prevailing as regards the shipment of pitch from these particular ports.

It is estimated that at the Humber ports and the Norfolk and Suffolk ports, pitch has been 3s. to 4s. per ton below the parity which it previously bore to other places—such as London, &c. At other ports on the East Coast (other than London), prices are 2s. to 2s. 6d. per ton below the former parity.

Where contracts, therefore, exist for tar (based upon "JOURNAL" prices) the natural outlet of the pitch portion of which is the Humber or Norfolk or Suffolk ports, 2s. per ton should be deducted from the price which would otherwise be paid for the tar on the terms of the contract; and where contracts exist for tar the outlet of the pitch portion of which is an East Coast port other than London, Humber, Norfolk, or Suffolk ports, the figure to be deducted from the tar shall be 1s. 3d. per ton from the price which would otherwise have been paid on the contract.

NOTES FROM WESTMINSTER.

THE expectation that the two Houses would rise last Thursday for a long Easter recess did not come to pass. Important Bills—such as the Defence of the Realm, No. 2 Bill—had to be disposed of before the Houses could be permitted to disband; but the Prime Minister has promised that the release of members from parliamentary duties shall commence to-day, and that their attendance will not be required again before the 14th of April.

The Treasury Restriction.

Into the Private Bills of all kinds and purpose the clause put forward by the Treasury is being inserted. It provides that no capital shall be raised by the promoters during the war, nor for twelve months after, without the prior consent of the Treasury. The clause is being inserted in Bills irrespective of whether they are the promotions of companies or of local authorities. There was a little discussion of the matter last week (p. 573).

Financing During the War.

Attached to the auction clauses in the Ascot Gas Company's Bill, it will be remembered, was a provision proposing to liberate the Directors from the tight-lacing of these clauses for a number of years covering the period when capital difficulties may be expected owing to the war. The provision has not been allowed by the Unopposed Bills Committee. The Committee would not depart from established precedent, and particularly on a hypothetical case, which may or may not materialize. The work of legislators is to legislate, and not to be hide-bound by established precedent. In legislating, it is part of their duty to provide for contingencies. The Committee, however—if we follow the argument—think it is not their duty, if it interferes with long-established precedent. In the discussion on the subject, it was stated that the auction clauses had been framed with many considerations in mind. We guarantee not such considerations as those now obtaining.

Borrowing Powers Proportion—One-Half.

However, if the Ascot Company did not secure the main concession sought by the Directors consequent on the war, they obtained from the Committee additional consideration in respect of the borrowing powers. In view of the war, it is desired to make greater use of the credit of the Company in raising capital; and so the Directors asked that the borrowing powers should be increased to £75,000, but that the amount borrowed should never be in excess of a sum equal to three-fifths of the paid-up capital for the time being. The usual proportion is one-third; and the Committee declined to go as far as three-fifths, but allowed one-half.

No-Margin Calorific Standard.

It will be remembered that there are certain Bills in Parliament this year which propose a fixed calorific standard of 500 B.Th.U. (total heat basis), instead of 540 B.Th.U., with a margin of 7½ per cent., which brings the penalty-line to 499½ B.Th.U., or practically 500 B.Th.U. The change simply rules-out the margin, which some people will look upon as a good thing. The Board of Trade have no objection to the change; and the Unopposed Bills Committee have been passing the measures in which the fixed standard appears.

Reduced Repayment Periods.

The Doncaster Corporation Bill has been before the Local Legislation Committee, presided over by Mr. Middlebrook; and Mr. Robert Watson has satisfied them that what was being asked for in connection with the undertaking which he so ably manages is well deserved. The limits of supply are to be extended, new lands purchase powers are given, and there is to be a passing from the illuminating power standard to the calorific value one. The only alteration made has been in connection with the borrowing powers. A sum of £65,000 was desired for the purchase of lands, for the erection of gas-works, and for the general purposes of the undertaking; and a repayment period of forty years was asked. In respect of £55,000, a period of thirty years has been granted, and in respect of £10,000, for meters, &c., ten years.

COAL SUPPLIES AND THE BOARD OF TRADE.

The Manchester District Deputation.

IT was intimated last week that a deputation from the Manchester District Conference on Coal Supplies would have an interview with the President of the Board of Trade on Wednesday (the 10th inst.). At the hour appointed for the interview, the members of the House of Commons were engaged in considering the Defence of the Realm Act (No. 2) Bill; and, in consequence, Mr. Runciman had to be on the front bench. In his absence, Mr. J. M. Robertson, the Parliamentary Secretary to the Board of Trade, received the deputation, who were introduced by Mr. C. T. Needham, M.P. for the South-West Division of Manchester. Mr. Robertson listened most carefully to the views of the deputation, and promised to lay them before the President of the Board.

The following is a list of the members of the deputation

BIRMINGHAM—
- Alderman Sir Hallewell Rogers, J.P., Chairman of the Gas Committee.
- Captain R. S. Hilton, Secretary and Manager.

BRADFORD—
- Councillor J. H. Barraclough, Chairman of the Gas Committee.
- Mr. Charles Wood, Engineer and Manager.

LEICESTER—
- Mr. Hubert Pooley, Engineer and Manager.

MANCHESTER—
- Alderman William Kay, Chairman of the Gas Committee.
- Alderman Hassall, Deputy-Chairman of the Committee.
- Mr. Frederick A. Price, Superintendent of the Gas Department.

NOTTINGHAM—
- Alderman A. Ball, J.P., Chairman of the Gas Committee.
- Councillor H. Gover Ford, Vice-Chairman of the Gas Committee.
- Mr. J. Wilkinson, Engineer and Manager.

SALFORD—
- Alderman F. S. Phillips, Chairman.
- Mr. W. W. Woodward, Engineer.

GAS LIGHT AND COKE COMPANY.

Increase in Price to Consumers North of the Thames.

We are informed by the Secretary (Mr. H. Rayner) that the following circular is being issued to consumers in the district of the Gas Light and Coke Company North of the Thames.

The Directors of the Gas Light and Coke Company regret having to announce that the price of gas in the Company's district North of the Thames will be increased by 4d. per 1000 cubic feet —*i.e.*, from 2s. 8d. to 3s.—as from the date of recording meter-indices for the current (Lady-day) quarter.

The increase in price now announced is rendered necessary by the further large advance not only in the price of coal, but especially in the charges made for steamer freights, as a result of the war. The public may rest assured that so soon as it is possible the price will be again reduced, in accordance with the past policy of the Board.

This advance in price involves, by law, a substantial reduction in the dividend to the shareholders.

PERSONAL.

At the meeting of the Institution of Civil Engineers last Tuesday, Mr. William Alexander Niven, of the Bombay municipal water-works, was elected an associate member.

Mr. H. Fortune, who has been Manager of the Torpoint Gas Company for the past six years, is about to leave there to undertake the management of the Ivybridge Gas-Works. Last Thursday he was presented with a case of cutlery by his friends at Torpoint, where he has won high esteem by his courtesy and consideration for those with whom he has been brought into business contact.

By the retirement of Mr. J. Saynor from the position of Works Superintendent of the Great Grimsby Gas Company, the undertaking will lose the services of one who has served it faithfully and well for the long period of thirty years. The Directors have granted him a liberal retiring allowance; and he will carry with him into his retirement the hearty good wishes of a very large number of friends.

At the usual monthly meeting of the Mossley Town Council last Thursday, the Mayor (Alderman J. Bradbury) mentioned that Mr. James Taylor, the Gas Engineer and Manager, was leaving their service and proceeding to Weston-super-Mare. He (the Mayor) was sure they all agreed that while Mr. Taylor had been in the town he had displayed that high character and dignity to which they were accustomed among the officials of Mossley. Their good wishes would go with him to his new place; and it was their hope that his successor would act as he had done.

The Beal Medal of the American Gas Institute has been awarded to Mr. Owen Brooke Evans, for his paper on the "Carbonization of Coal in Vertical Retorts," presented at the meeting of the Institute in 1913, and noticed in the "Journal" for Nov. 18, 1913 (p. 587). The award was made by the Beal Medal Committee (of which Mr. W. Cullen Morris is Chairman) on the recommendation of Mr. William H. Gartley, the President for the year, who was appointed by them to select the best paper submitted to the meeting.

OBITUARY.

News was received late last night of the death of Mr. William Blair, the Manager of the Helensburgh Gas-Works. When cycling in Helensburgh on Saturday afternoon, he was thrown from his machine, which was being propelled by an auto-wheel. His skull was fractured; and he died in Helensburgh Infirmary on Sunday. Some further particulars as to his professional work will appear next week.

One of the promoters of the Chichester Gas Company has just passed away in the person of Mr. Robert Shelley Church, who was interred in Chichester Cemetery last Tuesday afternoon. Deceased was Manager of the Company prior to the appointment of the late Mr. T. E. Pye; but he had resided away from the city —his death taking place at Southsea, at the age of sixty-four. His father, Mr. Robert Monk Church, was Mayor of Chichester in 1882. The funeral was attended by Mr. Victor V. Vick (Secretary), Mr. T. N. Ritson (Manager and Engineer), and other members of the Company's staff.

The death occurred a few days ago, in his sixty-third year, as the result of an attack of pneumonia, of Mr. William Froggatt, of Chapeltown, the Chief Engineer at the Thorncliffe Iron-Works of Messrs. Newton, Chambers, and Co., Limited, in which capacity he was known to many gas engineers and managers. He was an associate member of the Institution of Civil Engineers, and a member (and I.P.M.) of the Wentworth Lodge of Freemasons. He leaves a widow, four sons, and four daughters. Mr. Froggatt's illness was of only short duration, as early in the month he was at the Whittington Gas-Works, where his firm have lately completed a gasholder in a steel tank, to the designs of Mr. Septimus Penny, Assoc.M.Inst.C.E.

ELECTRICITY SUPPLY MEMORANDA.

It is a proper thing to look forward. The neglect to do so often brings a penalty of a disagreeable and dispiriting nature. The war has for so long now been a part of our daily existence that we are afraid some people are beginning to look upon it as being of a permanent nature. They are, of course, the thoughtless ones; the others know well that the present conditions cannot go on for ever, although the War Lord has not, in any of his published war time-tables, condescended to hint at a date when his enemies will kneel before him pleading for mercy and peace. However, the writer of "Installation Topics" in the "Electrical Times" is hopeful—indeed, very hopeful—as to an early termination of the frightful campaign. He entertains the notion—basing judgment upon the present condition of affairs —that there will be no need for restricted public lighting next autumn. We are delighted to know that this is his view, because the end of restricted lighting means the end of the war; and that is a consummation all desire, so long as the end means a permanent peace, and the complete smashing of the species of militarism that has for so long been a standing menace to international comfort. However, "Installation Topics" bids his readers look forward; for on the declaration of peace, what will happen? We shall celebrate the event in our own individual fashions. But shopkeepers will fly from the one extreme to the other in the matter of light; and there will be a great demand for new lamps, for the old ones will not have improved during their enforced idleness. There will also be public rejoicings and illuminations. During the coming days of many natural light hours and few dark ones, there should be a careful overhauling of lamps that have been out of action. It is a question of looking forward and being ready, and not, when the day of rejoicing comes, be found with the right to classification with the foolish virgins, and for the very reason which earned them distinction.

When the Hour of Peace Strikes.

Percentage Coal Deliveries.

The managements of electricity concerns, like those of gas undertakings, are still uncomfortable over the inadequacy of coal deliveries. But some of the electricity concerns appear to have rather curious contracts running with their coal suppliers, as well as contractors who are able to measure very exactly their present ability to supply those with whom they have entered into contracts. There is Darwen, for example. The Electricity Committee have been informed that, owing to the reduction of output through miners enlisting, the contractors are compelled to reduce the contract supply by 25 per cent., "or" (so that there is an alternative) they must charge 1s. 6d. per ton above the contract price for any coal delivered over 75 per cent. of the contract quantity. If the facts are correctly reported, they mean that the contractors find that, owing to the extent of the enlistment of miners, it is humanly impossible to deliver more than 75 per cent. of the contract quantity; but by some, to us occult, means the impossibility in regard to the last 25 per cent. may be overcome by crossing the hands with a little silver—to wit, 1s. 6d. for every ton of coal delivered beyond the 75 per cent. If 75 per cent. can be supplied at the contract price, then, if it be possible to supply more, it is difficult to see where the justification for the additional charge for the latter comes in. There is going to be trouble between the Heston and Isleworth District Council and their contractors, who aver that they cannot deliver more than 60 per cent. of the quantity contracted for, owing to the colliery from which the coal is drawn having had to restrict its output. The contractors (unless in some way they are guarded in their contract) are likely to find their inability to supply an expensive one. They have been advised that, unless coal is delivered to the extent guaranteed in the contract, the Council will buy against them; and 200 tons have already been ordered from another quarter. This will stir-up the contractors to exert pressure on the colliery. At the recent coal conference held in Manchester, and we believe also at the interview with Mr. Runciman last Wednesday week, statements were made to the effect that, while some colliery owners are not maintaining their schedule deliveries under contracts, they are marketing coals at the higher prevailing rates. In other words, these owners are making considerable sums of money out of coal which ought to be going to those customers with whom presumably honourable contracts were made prior to the war.

An Inclusive Charge.

For some time past, the restless Mr. A. H. Seabrook has been profoundly convinced that, even by squeezing the charges for current for cooking and heating down to the lowest possible limits, there would be no very general demand for electricity for these purposes unless the necessary apparatus was thrown in almost free. In consequence, he has been hankering after an apparatus and electricity covering charge; and we believe he has now secured what he wanted. Anyway, the Electricity Committee have proposed the addition of another tariff to the already thickly tariff-coated concern. To cover current and apparatus, the proposal is that, instead of an annual lump charge *plus* ½d. per unit, there shall be an annual lump charge *plus* ¾d. per unit—the extra ¼d. being for the hire of apparatus. The "Electrical Times"

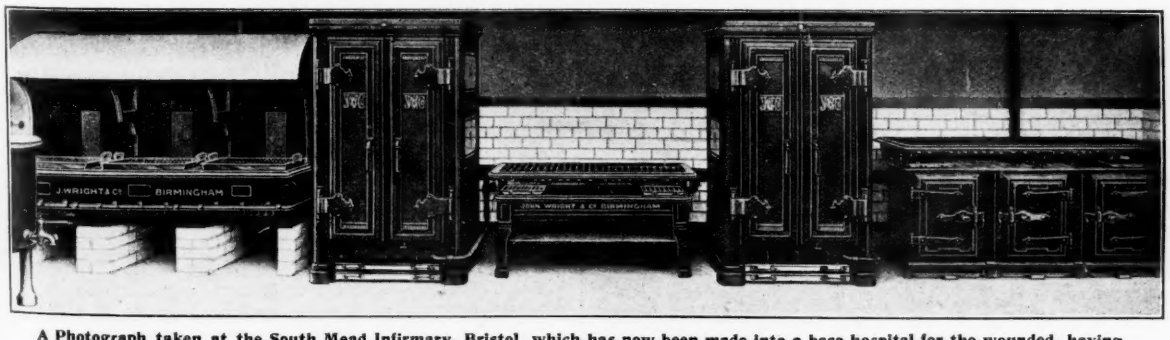
says there is this stipulation attached: "Each consumer would be expected to use current equivalent to two-thirds of the value of the standard hire rates of the apparatus on hire." We suppose our contemporary means by this equivocal gem that each consumer will be expected to use sufficient current to produce, through the ¼d. per unit, at least two-thirds of the amounts of the standard hire rates of the apparatus. This is hardly fair to those who pay, and have been paying, the standard hire rates. Why should not these people be compelled to use (or to pay the difference) current sufficient to produce, through the ¼d., the whole amount of the ordinary hire rates? Why should they have any preferential treatment under the "cover-all" price? Parliament prefers that local authorities "shall so adjust the charges to be made by them for any such fittings [gas or electricity], or for the fixing, repairing, or removal thereof, as to meet any expenditure by them under the powers of this section in connection therewith, including interest upon the money borrowed for those purposes, and all sums applied to sinking fund for repayment of moneys so borrowed." That is the preference of Parliament. But there is something beautifully haphazard about the Marylebone manner of getting in a full counterbalance to sinking fund, interest, maintenance, and depreciation. There is no certainty that the charges incurred will ever be covered; the consumers may not approve of the apparatus after they get it. If they do not, they will not use it; and then all the return for it would be the ¼d. extra plucked off the lighting units.

The "Progressives'" Goal.

In the "Memoranda" in our issue for Feb. 23, reference was made to a piece of perversion, on the part of "Electrical Industries," of some remarks we had made, which perversion must have caused our argument to look very foolish to those who had not seen the original. The misrepresentation, it appears from the explanation that has been made, was due more to sheer carelessness than to a deliberate desire to misrepresent; and our contemporary has offered reparation to quite the extent we could have hoped for by reproducing its remarks with the sentence inserted, the omission of which had completely spoilt the point of the argument. The matter, it will be remembered, arose over the assertion by our contemporary that "in progressive electrical undertakings, the line of action is based upon a conviction that electricity is destined to *oust gas completely* in lighting, cooking, heating, and industrial power." Naturally, we were curious as to what the intelligent folks manning those "progressive electrical concerns" thought was going to be done with the gas resulting from the carbonization of coal that must be continued in order to obtain the coke, tar, ammoniacal liquor, and the hundreds upon hundreds of derivatives of the distillation of tar—derivatives necessary to the world in times of both peace and war. We therefore inquired whether these revolutionists thought the valuable heat energy of the gas was to be wasted? How on earth were we to know what would be the idea on this head of men whose line of action was based upon the mad-brained conviction that low thermal value electricity was going to oust high thermal value gas for all the purposes for which it is used. Now we have our contemporary's assurance that those "progressives" do not contemplate anything so silly as blowing the gas into the air. It is a satisfaction to know that their foolishness does not run this length. Their idea is the old-fashioned one that coal should be carbonized at electric power stations (of course, the gas industry will then have ceased to exist), the bye-products recovered, and the gas be used to drive engines for the generation of electricity. We see, but are not prepared to trouble our minds vastly over something that is not likely to happen in our own lifetime. These electricians are Germanic in their schemes. They do not mind how much devastation they cause, or how much the world is thereby deprived of economy, so long as they can attain their end. Perhaps a simpler process than theirs, and one which would make more rapid progress, would be for the electricity concerns to tap the existing gas-works for a gas supply for the generation of electricity. This would save an awful amount of scrapping and waste; and then those people who prefer gas generating (say) 530 to 550 B.Th.U. per cubic foot to electricity giving only 3420 B.Th.U. per unit can still be satisfied. But, of course, it must depend upon whether those "progressive" electricals whose line of action is the one mentioned will allow the gas industry to continue doing a bit of business in supplying with gas people who like to obtain the greatest value for their money, and in serving the world with many of its requirements besides gas. It seems such a pity that all those extensive plants not only for producing gas, but for dealing with the secondary products, should be laid waste in order that the ideal of a few fanatics—or imbeciles—may be attained.

Inter-communication Schemes up North.

In a reference recently to the London County Council scheme, mention was made of Mr. Merz's estimates and prognostications regarding it—this gentleman being the fount of technical wisdom drawn upon by the County Council. There was also intimation of the fact that Mr. Andrew Gemmell, with experience of the results realized by the Cleveland group of Electric Power Companies, had not any ground for confidence that those paper estimates and prognostications would be fulfilled. Mr. Gemmell, it seems, was at one time the Secretary to two of the Companies comprised in the Cleveland group; but disagreement over certain matters of policy induced him to resign. He has since been a critic of the affairs of the concerns in question; but his criticisms seem to fall on stony places, and do not yield the fruit he devoutly desires—that is, a full and independent inquiry into the inter-workings of the concerns, their financial relations, and the effects generally from the public point of view. The questions that he raises are of public interest; and there ought to be a settlement of them once and for all. The group of companies consists of the Cleveland and Durham Electric Power, Limited (the dominant or holding company), which acquired full control in 1906 by buying the shares of the Cleveland and Durham County Electric Power Company (parliamentary), and the Northern Counties Electricity Company, Limited, which work under Provisional Orders. These separate Companies (comprising one business) have the same engineers, who are also commercial supervisors of the business, and, according to the prospectus issued in 1906, have practically the same Board. Then there is the Waste Heat Company, with the same engineers, but a different Board. This was formed in 1907; and although the Cleveland Company's prospectus of 1906 (Mr. Gemmell says) made no mention of a waste-heat scheme, it was shown by the first prospectus of the Waste Heat Company, issued in 1909, that the Cleveland Directors had committed the group to the waste-heat experiment before the first annual meeting of the Cleveland Company in 1907. The burden of Mr. Gemmell's complaint is that the control by the operating Company of the Cleveland and Durham County and the Northern Counties Companies defeats the intentions of the Legislature regarding the protection of public interests. The *rôle* played by the Waste Heat Company seems to be that of providers of plant, which is rented from them by the holding Company. Some 75 per cent. of the requirements of the business are obtained from waste heat; and the Cleveland group has on hire some two-thirds of the stations and plant that belong to the Waste Heat Company. The reports made by the Auditors of the Board of Trade in effect (so it is gathered from Mr. Gemmell's statement) ridicule a condition of things under which one company of the group leases its generating stations and plant to the dominating concern, which sells back to its subordinates the product of the subordinates' own plants—that is to say, electric current—at a price fixed by the dominant Company. The Board of Trade Auditor cannot check the figures. Each Company has a separate auditor, so that there is not what Mr. Gemmell considers there should be, one audit of the combined business in order that the large transactions between the Company as a whole could be properly checked. He also contends that the control acquired by the dominant Company by buying the shares of Companies invested with statutory powers is contrary to section 11 of the Electric Lighting Act, 1882, and section 14 of the Electric Lighting Act of 1909. The comment of the Board of Trade Auditor upon this condition of things is: "It follows, therefore, that the authorized undertakers are undertakers in name only." The Board of Trade are thus fully cognizant of what has taken place, and have not (so far as we know) moved in the matter.



A Photograph taken at the South Mead Infirmary, Bristol, which has now been made into a base hospital for the wounded, having been taken over by the War Office. The gas installation shown (which is by Messrs. John Wright and Co., of Birmingham) is a very compact one, and comprises two "Rostrum" ovens, a "Marathon" hot-plate on stand, and a series of fish-fryers, as well as a treble cooker, with grilling accommodation over it.

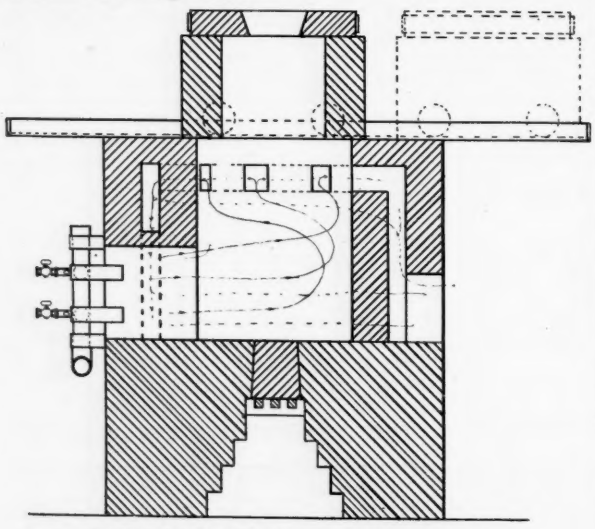
RAPID ADVANCE OF COAL GAS AS A FUEL FOR INDUSTRIAL PURPOSES.

From the Early Days of Thomas Fletcher.

THE advance of coal gas as a fuel for industrial purposes during the last twenty years has been surprisingly rapid; and one has only to visit many of the large manufacturing centres of the country to find working evidence of the numerous and varied types of gas-heated furnaces and apparatus now available.

For the pioneering of this important branch of industry, gas undertakings and manufacturers have to thank the late Thomas Fletcher (of the firm of Fletcher, Russell, and Co., Limited, of Warrington), who started in a very modest way to apply gas to small melting furnaces and muffle furnaces, constructed specially by him to suit his then professional work—that of a dentist. At the very commencement of his career as a maker of gas-heated apparatus, Mr. Fletcher drew the attention of gas engineers to the large field that lay before them for the use of coal gas as a fuel for industrial purposes; and to-day the many and varied kinds of furnaces and other heating apparatus manufactured by the firm prove how accurate was his foresight, and how well-founded were his convictions as to the advantages of gaseous firing by coal gas. There is no other firm in the world with an equal length of experience in this line of business, nor one which has developed it to equal extent. By them, a very high standard of perfection has been reached, and specialization is found in all kinds of manufacturing apparatus to which heat is essential—from bunsen burners consuming about 3 cubic feet per hour to large high-power burners consuming 3000 to 4000 cubic feet per hour; from small crucible furnaces for melting hard metals, holding 3 oz. or 4 oz. to 400 lbs. or 500 lbs.; from muffle furnaces taking muffles 4 in. by 3 in. by 2 in. to furnaces taking muffles 36 in. by 24 in. by 24 in.; and furnaces to harden and anneal iron plates up to 9 ft. by 9 ft. by 1½ in., burning about 2000 cubic feet per hour.

A glance through the firm's catalogue gives an insight into the growth of the trade; but, better still, to go through the hundreds of prints of articles not listed causes one to wonder if there is any trade to which gas heating has not yet been applied. To build up a trade of such importance and magnitude requires very many years of experience; and no doubt it is due to this experience that the firm's name is famed throughout the world for this class of goods. There is scarcely a Foreign or Colonial Government who do not use their furnaces in their manufacturing departments, at the mints, arsenals, &c. In some towns coal gas is not a cheap industrial fuel; but, with its many advantages, it compares very favourably with solid fuels. At the present day, however, most progressive gas undertakings are supplying gas at reduced rates for trade purposes; and it is the belief of the firm that, in industrial centres, this business will soon be one of the largest sources of income for the gas-works.



Section of a Four Hundred Pound Crucible Furnace.

We reproduce a print, showing a section of one of Messrs. Fletcher, Russell, and Co.'s largest patent crucible furnaces. It takes a crucible holding 400 lbs. of metal. Using coal gas at ordinary pressure, assisted by air under pressure, there is no difficulty with this in melting brass for casting at 2·75 cubic feet per pound; copper at 3·75 cubic feet per pound; and nickel bronze at 6 cubic feet per pound. The inner and outer walls of the furnace are built of suitable material to give the best results, and to stand ordinary workshop use. The burners are of the firm's latest design—of the blast type, and constructed to give a maximum duty for the gas consumed. The firm's success in this line has been due to the general construction of the apparatus as a whole, and to the burners used—special regard being paid to the most economical use of gas in relation to work done.

SLOT-METERS FOR ELECTRICITY IN HOLLAND.

[FROM A LOCAL CORRESPONDENT.]

IN the "Ingenieur," the weekly paper of the Society of Dutch Engineers, Heer Lulofs, M.Sc., the Director of the Amsterdam Municipal Electricity Works, lately had an article on the subject of slot-meters for electricity. As the municipal authorities in Dutch towns are generally very electrophile, notwithstanding that the gas-works contribute largely to the relief of the rates out of their profits, it is a fact that the use of electricity is very much preferred by them. In consequence, the introduction of electrical slot-meters is promoted in Amsterdam, not only for workmen's cottages, but also for the use of those inhabitants who lodge in rented premises. These meters are therefore to be found in physicians' houses or in flats let at £50 a year rent. The reasoning leading to the adoption of this system is as follows: In general a family paying rent of about £50 a year is rich enough to put down a lump sum of £20 for a complete electrical installation; but as the house is not their property, this sum is a sort of fee paid to the owner, as after the expiration of the term for which the place is taken, the installation is appropriated by him without paying a farthing for it. On the other hand, it is considered that a complete installation for electric lighting raises the value of the house, and so it is possible the money expended by the occupier causes the proprietor to raise the rent after the expiration of the tenancy. In order to prevent this, the authorities have decided that slot-meters can be placed in every rented house or part of one.

The ordinary prices per unit for current are 3d. for lighting and 2d. for power; but with slot-meters the prices are 3½d. and 2d. respectively. These meters have not separate registering devices for light and power. The problem has been solved in another way. The coils are all wound on two bobbins. For the lighting current both must be passed; but the power current, working on a separate switch, flows only through one bobbin, and in this way the units of power current are translated into the corresponding number of lighting units, and only these are registered. There are three sorts of meters—for halfpence, fivepenny pieces, and guilders (2od.); and consumers choose which they will use.

A special feature of the system under consideration is that the officials of the electricity works do not put in house installations. A calculation has been made of their costs, and every *bonâ-fide* private firm can, by signing a contract, obtain the right to make these installations. The consumer has nothing to do with this transaction. The private firms carry out the work, and are paid out of the municipal funds. Only the meter is fixed by the municipal workmen, who also make the connection between it and the street cable. This combination proves to be very successful. In the first place, the firms require only a small staff of workmen; and this keeps their working expenses low. But, above all, being interested in installations, they are very ardent promoters of them, and their canvassers go from house to house in order to secure new consumers. It seems to be a point of considerable interest whether this system of combined trade might not also be profitable to the gas industry. It has a twofold benefit—it reduces the number of private complainers and it gets rid of workmen's disputes. In order to prevent abuse of the system by a consumer employing power current for lighting purposes, the switches for the former are of special construction, and are not purchasable commercially. They are sold only at the electricity works to consumers who have motors or flat-irons in use.

A slot-meter installation has eight light-points. The minimum consumption per annum has to amount to ten guilders (16s. 8d.) for four light-points, and one guilder (2od.) more for each additional point. The cost of an installation comes to £10 18s. 4d., and produces an average yearly revenue of £3 5s. 6d. The cost of the house installation is £4 8s. 4d.; of connecting it to the street cable, £1 13s. 4d.; and of the slot-meter, £2 6s. 8d.—making a total of £8 8s. 4d. The difference between this amount and £10 18s. 4d. is the portion of the capital outlay required for cables. From calculations made it has been found that a workman has an average yearly consumption of 100 units of electricity, and that consumers of the better class use 475 units annually.

The Late Mr. Henry Rofe.—Some particulars have reached us of the life-work of the late Mr. Henry Rofe, whose death was briefly recorded in the last number of the "JOURNAL." He was a son of the late Mr. Henry Rofe, the Engineer of the Birmingham Water-Works and Professor of Engineering at Queen's College, Birmingham. He held the positions of Sub-Engineer and Acting-Engineer to the Birmingham Water-Works from 1860 to 1866, and later was engaged till 1879 in the construction and management of the Rochdale, Nottingham, and Southport Water-Works. In 1885 he entered into partnership with Mr. Edward Filliter, and practised with him as a consulting engineer in Leeds and Westminster until Mr. Filliter retired from the profession. Then, in 1901, he took his son, Mr. H. J. Rofe, into partnership with him. He constructed water-works for the Burnley, Wakefield, Oswestry and Newark-on-Trent Corporations, the Southport, Birkdale, and West Lancashire Water Board, the Holyhead and Newquay Water Companies, and other bodies. In 1905 he visited and reported upon the water supply of the Cape Peninsula. His firm only completed last year the Buersill service reservoir for the Rochdale Corporation, and the Rushmere station for the Felixstowe and Walton Water Company is nearing completion.

SOUTHERN DISTRICT ASSOCIATION OF GAS ENGINEERS & MANAGERS.

The Annual Meeting of the Association was held last Thursday, at the Hotel Cecil, Strand, W.C. At the commencement of the proceedings the retiring PRESIDENT (Mr. Thomas Glover, of Norwich) occupied the chair. Considering the prevailing conditions, there was a good attendance.

MINUTES CONFIRMED.

On the suggestion of the PRESIDENT, the minutes of the last meeting were confirmed.

ANNUAL REPORT OF THE COMMITTEE.

The HON. SECRETARY (Mr. H. C. Head) read the annual report of the Committee, as follows:

The Committee have pleasure in presenting the fortieth annual report to the members of the Association.

The annual meeting was held at the Hotel Cecil, Strand, W.C., on Thursday, March 12. The retiring President, Mr. H. O. Carr, was in the chair, supported by Mr. Edward Allen, the President of the Institution of Gas Engineers.

The report of the Committee and the accounts for the year 1914 were adopted.

The report of the Sub-Committee on the Education of Gas-Fitters was presented by the Hon. Secretary, and was unanimously adopted, on the motion of the President-elect (Mr. Thomas Glover).

The President presented to Mr. Price, of Hampton Wick, an illuminated address, expressing the high appreciation of the Association of his services as Hon. Secretary from 1910 to 1913.

Mr. Thomas Glover was appointed representative of the Association on the Council of the Institution of Gas Engineers.

The chair was then taken by the new President, Mr. Thomas Glover, who delivered his Inaugural Address, dealing mainly with the subjects of coke, tar, and the treatment of roads, the motor fuel outlook, and the working of tower scrubbers. The address constituted a most able and original *résumé* of the important topics of the year; and a vote of thanks, which was received with acclamation, was accorded to Mr. Glover.

At the close of the address, the President, on behalf of the Directors of the British Gaslight Company, invited the members to visit the Norwich Gas-Works.

In the evening, the members dined together; the President being in the chair.

On May 21 an interesting visit was paid to Norwich, where the members were received by Mr. Glover, who was able to show a road in process of being "macgrouted" upon the system described in his presidential address.

After visiting the Guildhall, the members were given the opportunity of inspecting the St. Martin-at-Palace Gas-Works, where many features of special interest were to be seen.

The members were afterwards entertained at lunch by the British Gaslight Company, represented by the President in the chair; there being also present the Lord Mayor of Norwich, with several members and officials of the Corporation. The Lord Mayor, in replying to the toast of "The City of Norwich," proposed by the President, remarked upon the friendly relations existing between the municipal-owned electric undertaking and the Company-owned gas undertaking, under Mr. Glover's able management. Mr. Price, of Hampton Wick, proposed the "City and Trade of Norwich," for which Messrs. Morse and Howlett, members of the Corporation, responded. Mr. H. J. Copeman proposed the "Southern District Association of Gas Engineers and Managers," and alluded to the great prosperity of the gas industry—more especially in the City of Norwich. To this toast, the President responded. Mr. Mason, the Secretary of the British Commercial Gas Association, proposed the "British Gaslight Company." Mr. G. Lowe, Chief Clerk of the Norwich station, briefly responded.

After luncheon a visit was paid to the Cathedral, where an enjoyable hour was spent in inspecting the noted beauties of this magnificent building, which was most charmingly described by the Very Rev. the Dean of Norwich, who himself kindly conducted the party round.

The members afterwards left for the Bishop Bridge Gas-Works, where they were received by Mrs. Glover, who presided over tea. This was the close to a most successful and delightful day.

The autumn meeting was held at the Hotel Cecil on Nov. 12; the President, Mr. Glover, being in the chair.

Mr. Auchterlonie, of Cambridge, was unanimously elected President, and Mr. W. Doig Gibb Vice-President, for the ensuing year.

Messrs. W. E. Price and G. M. Gill were elected to fill the vacancies on the Committee; and Mr. H. C. Head was re-elected Hon. Secretary and Treasurer. Messrs. James L. Chapman and Alexander Dougall were re-elected Hon. Auditors; and Mr. A. F. Browne, Hon. Auditor of the Commercial Section.

The report of the Commercial Section was read and adopted. It was reported that two companies had resigned, and six had become members; the total membership being now 62.

The report of the Sub-Committee on the Education of Gas-Fitters was read; and, after a general discussion, in which several members joined, it was adopted.

Mr. Samuel Glover then read a paper (illustrated by lantern slides) on the "Microscopic Examination of Coals." The President moved a vote of thanks to Mr. S. Glover for his interesting and useful paper on a new and original subject. This was seconded by Dr. Rudolf Lessing, and, on the motion of Mr. D. T. Livesey (East Grinstead), there was also included in the vote Mr. Lomax, who had prepared the lantern slides.

During the year nine new members were elected; the number of members being now 190. The new members were: Messrs. C. Valon Bennett (Rochester), J. J. Coe (Arundel), C. M. Croft (Wandsworth), Samuel Glover (St. Helens), N. G. Lemmon (Horsham), Rudolf Lessing (London), F. G. Matthews (Chertsey), W. H. Price (Reigate), and T. N. Ritson (Chichester). During the year, five members resigned.

The subscriptions for the year 1914 amounted to £98 3s. 6d. The expenditure exceeded the receipts by £3 15s. 9d.; the balance carried forward being £92 11s. 1d. The expenditure was larger than usual, due to extra correspondence and printing in connection with the Education and Examination of Gas-Fitters.

The PRESIDENT proposed the adoption of the report. He said the members would notice that they were not carrying forward quite so much as was brought forward. There was good reason for this. The expenditure had been larger on correspondence and printing connected with the education of gas-fitters. He therefore took it that the members would be satisfied, because, although they were apparently not in quite so good a financial position, they had been doing more business which would be remunerative, he hoped, in the days to come.

Mr. C. F. BOTLEY (Hastings) seconded the motion, remarking that the Association had had, apart from the war (which was on everybody's mind), a very successful year. He regretted that he was unable to participate in what he knew was the very enjoyable visit to Norwich.

The motion was unanimously carried.

EXAMINATIONS FOR GAS-FITTERS.

The HON. SECRETARY remarked that there was hardly any need for a report on this subject, seeing that the Examination of Gas-Fitters' Committee had not met for some time. But it was felt that the members would like to know what had been done. The Southern District Association had managed to give some really valuable assistance to the movement for both the education and examination of gas-fitters. There had been considerable correspondence with the City and Guilds of London Institute—not only in connection with the examinations in the southern district, but also in regard to supplying examiners for districts in the Midlands, where there seemed to be a great famine in examiners. The notes on the subject which had been prepared for the meeting were as follows:

As reported to the last meeting, the education of gas-fitters has been receiving attention, and a Special Sub-Committee has been dealing with the matter. Arrangements have been made to hold examinations in the following towns:

London—Hackney Technical Institute, Westminster Technical Institute, Acton-Chiswick Polytechnic. East Ham Technical College. Exeter. Cambridge.

The following gentlemen, to whom the members are indebted, have kindly consented to act as practical examiners, through the courtesy of the respective Engineers: W. H. Wayte, District Superintendent, Norwich; F. Caudwell, Chief Inspector, Exeter; H. A. Wall, Head Inspector, Wandsworth; F. Ainsworth, H. S. Collister, T. Hurry, Inspectors, Ilford; H. Sword, Outdoor Assistant, Cambridge; S. J. Smithers, Gas Light and Coke Company; S. B. Chandler, South Suburban Gas Company; J. Hewett, South Metropolitan Gas Company.

Mr. N. H. Humphrys (Salisbury) kindly offered to act as practical examiner at Exeter; and in a letter to the Hon. Secretary, he says:

> All candidates who attended showed activity and aptitude, and would have creditably passed stiffer tests than those presented on the question paper. His duties were greatly facilitated by the excellent arrangements carried out by Mr. Westlake and his Assistants. A roomy, well-ventilated workshop was available, having two long benches capable of taking two different grades. This arrangement was very convenient for the inspection of work in progress. Mr. Westlake said that the classes had improved the general quality of gas-fitting work; and from the results of his examination, he could well understand that this is the case. He came away from Exeter very strongly impressed with the advantages both to the employees and to the gas company afforded by these classes, and, indeed, of the urgent necessity for them in every district large enough to make up classes and secure a teacher or for combinations of adjacent undertakings for that purpose.

The Committee also wish to mention the very valuable assistance which has been given by Mr. Goodenough, whose Company has not only made arrangements to lend apparatus necessary for examinations in London, but arranged for assistants to act as practical examiners as far afield as Cambridge and Birmingham, in addition to the London district.

The PRESIDENT remarked that in this matter they had hardly yet got into full swing in most of their towns. So far as Norwich was concerned, they had not had an examination; but they had had a good deal of education going on. He knew the gas-fitters were quite keen to attend the practical demonstrations and lectures which were being held in a room specially set apart for the purpose, fitted with modern tools and appliances. He could bear out what Mr. Humphrys had said about the improvement in the young fellows, due to the education that had been proceeding. No doubt this was the right thing. The young fellows learned more at these demonstrations and lessons, after a few weeks' attendance, than they would do from years of ordinary watching the operations of gas-fitting. They got it in a concentrated form; and they had also the practical work and experience which was very important. He moved the adoption of the report.

Mr. W. B. FARQUHAR (Ilford), in seconding, said it was very

unfortunate that this year they had lost such a large number of young lads who would have come under the scheme—"unfortunate" in one sense, but fortunate that they had gone to the front. The war had certainly upset part of the plans for these classes; but it said something for the practical value of the scheme that it had, under the exceptional circumstances, been carried to even the success already experienced. He should like to add, in fairness to the inspectors from his own works, that they were most willing to give their services. They were very anxious to do anything they could to help the Examination Committee; and they gave their services willingly and ungrudgingly.

Mr. W. N. WESTLAKE (Exeter) observed that since Mr. Humphrys wrote his letter, he had received from the City and Guilds of London Institute information that all the men had passed the examination. He should like to thank Mr. Humphrys for the appreciative remarks he had made regarding Exeter. They were very glad to give any possible assistance. He thought if the examiners could make the examinations a little bit stiffer in years to come, it would be beneficial. His own men seemed to think this one was quite elementary.

The PRESIDENT remarked that, at the commencement of a new movement of this kind, it was, perhaps, a good fault not to make the examination too stiff.

The report was adopted.

NEW MEMBERS.

The HON. SECRETARY read the nominations for membership: Mr. S. O. Stephenson, of Worthing, Mr. Alec E. Whitcher, of Hawkhurst, Mr. Alex. G. Cheal, of Crowborough, and Mr. H. Kenneth Hoult, of Bordon, Hants.

The PRESIDENT moved the addition of these names to the membership roll.

Mr. P. G. G. MOON (Bournemouth) said he had considerable pleasure in seconding the motion. They were used to increases in gas companies—usually increases in output, but, he was afraid just now, increases in price also. Increases to which they certainly did not take exception were increases in the membership of the Association. Just as each private soldier was supposed to carry the baton of a future field-marshal in his knapsack, so he hoped they might consider, with some degree of certainty, that each of these members might in time to come reach the presidential chair.

The motion was unanimously carried.

THE RETIRING AND INCOMING PRESIDENTS.

Mr. GLOVER said it was now his pleasure to induct into the chair the new President. He (the speaker) had had his year of office; and for some things he was sorry to leave the chair. It had been nice to have been among the members as their President. They had helped and encouraged him in every way. They had been patient and kind; and he thanked them all very much. He should look back upon the year as one which had given him great pleasure, and as one that was a red-letter year in his professional existence. He had much pleasure in asking Mr. Auchterlonie to take the chair.

The new PRESIDENT (Mr. J. W. Auchterlonie, of Cambridge) took the chair, and received a hearty welcome.

The PRESIDENT thanked the members for their cordial reception. Proceeding, he said his first duty was to propose a very hearty vote of thanks to his predecessor for the able manner in which he had carried out the duties of the office during the past twelve months. When Mr. Glover took the position last year, the members had very high expectations, drawn from past experience of Mr. Glover in a higher sphere—that of President of the Institution. He did not think he could say anything higher than that their expectations had been fully realized. Mr. Glover had been an ideal President.

Mr. FRANK LIVESEY (Maidstone), in seconding the motion, said he had the privilege of listening to Mr. Glover's address; and he had seldom more enjoyed anything in the way of a Presidential Address. But it was with great regret that he found himself unable to go to Norwich to visit the gas-works and the interesting city. During the year that Mr. Glover had been President, the Association had held its own. It was almost a stretch of geography to bring Mr. Glover into the Southern district; and the new President came from a good distance. But the members were glad to welcome these two gentlemen from the Eastern Counties. Mr. Glover having set such a good example, he was sure Mr. Auchterlonie would in the current year do equally well.

The motion was heartily passed.

Mr. GLOVER thanked the President and Mr. Livesey for the kind way in which they had respectively proposed and seconded the vote of thanks, and the members for the hearty manner in which they had endorsed their remarks. Allusion had been made to the fact that Norwich was not usually counted as being in the Southern district. But he believed that Liverpool came into the Southern Counties—[Laughter]—so far as the gas engineer was concerned. Mr. Allen liked to be a member of the Southern Association. He (Mr. Glover) should have to ask the members to remember how he became connected with the Southern Association. The connection dated back to the time when the members used to discuss naphthalene at every meeting; and he was brought there, on the suggestion of one of the oldest members, to help to discuss naphthalene, or to find a solvent for it. He did contribute a little to their discussions in those days, and he also went to the length of reading a paper on the subject. They were not so bothered with that troublesome substance now; and this was partly due to the investigations which the Southern Association conducted, and the information obtained in those days by strenuous work.

REPRESENTATION ON THE INSTITUTION COUNCIL.

The PRESIDENT said their next duty was to elect a representative on the Council of the Institution. It was an unwritten rule or custom to appoint as the representative of the Association the President for the time being. He (the President) was already a member of the Council; and therefore on this occasion it was necessary to appoint some other representative. The Committee suggested the name of Mr. Doig Gibb, the Vice-President; and he (the President) had much pleasure in proposing him. Mr. Doig Gibb had written to the effect that he was ill, and was sorry he was unable to attend the meeting that day. They all regretted very much the cause of their Vice-President's absence.

Mr. W. G. HEAD briefly seconded the motion, and expressed, on behalf of the members, their sympathy with Mr. Doig Gibb in his illness.

The PRESIDENT then delivered the following

INAUGURAL ADDRESS.

Gentlemen,—Please allow me to express to you my thanks for the honour you have done me in electing me your President. I appreciate the confidence you have placed in me; and although I cannot hope to emulate the high standard set by our immediate Past-President, it shall be my endeavour to the best of my ability to promote the interest of the Southern District Association—feeling that I can count on the kindly consideration and support of the Committee and members.

It is no easy task at any time for a man, without a special subject, to write an address that will prove of interest to such an assembly as this; and if what I am about to say falls short of your expectations, I would claim your indulgence on account of the harassing conditions in which we have been placed for some time. At night Cambridge has been plunged into cimmerian darkness; and after groping my way home I have felt quite unable to sit down and write about matters that appeared trivial compared with the great issues at present at stake.

I need not dwell on the present deplorable state of affairs in Europe; but like all patriotic subjects of our great Empire I hope that the arms of the allies may be speedily crowned with complete success.

HOW HAS THE WAR AFFECTED US AS AN INDUSTRY?

Bearing in mind the devastation that is being wrought, and the paralysis of industry that is now almost universal throughout the Continental countries engaged in the struggle, we must conclude that the gas industry like our country in general has fared as well as can be expected in the circumstances. It is true that the gas-works at West Hartlepool have been seriously damaged in the bombardment of the town in December last; and our sympathy went out to Mr. Branson, the Manager, in his trying experience. It is also true that the Scarborough Gas-Works suffered some small damage; but although the gas engineers of Whitby, Yarmouth, and King's Lynn no doubt had an exciting time while the enemy's cruisers and zeppelins paid their hurried visit, no further actual damage has been reported.

The experience of most of us here has been of a less lively nature, and relatively quite unexciting. The effect on our industry has been of an economic nature with a certain amount of inconvenience in the carrying-on of our undertakings.

COAL SUPPLY.

The main trouble we have experienced, and possibly the chief cause for anxiety, has been the difficulty of getting adequate supplies of coal. The shortage appears to be now universal throughout the country; and as I write I know of several works that have only seven to ten days' supply.

We in the Eastern Counties did not experience this trouble until the end of November. In my case, we had no less than nine weeks' maximum supply at that time; and our difficulty was, not to get coal, but to keep some of our contractors down to schedule quantity. Since that time, however, I have had no cause to complain of excessive deliveries. In nine weeks, our stock has been depleted by five weeks' supply; and deliveries now are only 60 to 70 per cent. of our requirements. The handling of stocks means to us an extra charge of about 1s. per ton. I know that works depending on seaborne coal have felt the strain of short supplies for a much longer period than we who are supplied by rail. With the exorbitant rate charged for freightage, the outlook of such companies is indeed serious.

The Board of Trade Railway Department have for the past four weeks had returns weekly of coal deliveries; but I cannot say that there is yet any apparent improvement in our supply. Waggons are running very badly; and there must be great congestion somewhere on the railways. Collieries in South Yorkshire invariably state that their output is reduced by 20 to 30 per cent., and that they are unable to meet the demand. Yet we find the Executive Committee of the Miners' Federation passing a resolution opposing the suggestion for the suspension of the Eight Hours Act, and stating that the shortage in the supply of coal is not in any way due to the operation of the Eight Hours Act, and that large numbers of miners are not having the opportunity of

working more than a few days per week. This statement by the miners' representative requires investigation, as it is in contradiction to the general belief held by coal users throughout the country. The curtailment of the passenger train service may do something to facilitate the better running of mineral trains.

The action of the Government in releasing captured vessels for the carrying of coal has done a little, I understand, to alleviate the position in London and the South Coast; but the mere fact that shipowners are asking 10s. per ton more for freight than there is any reason for their getting (except that the war has caused an extra demand for freightage) is, I think, a justification for our Government fixing a maximum price for freights during the war.

I am not as a rule in favour of Government interference with prices. Usually the laws of supply and demand adjust themselves quickly; but in view of the fact that the Government has withdrawn something like one-fifth of the total shipping in this country for Admiralty purposes, and that the demand for vessels is no less, or very little less, I think it is not unreasonable to expect the Government to interfere in the matter. It is grossly unfair that shipowners should be enabled to make large sums out of our national misfortune, and at the expense of the other industries of our country. Gas companies must raise the price of gas; and the burden must inevitably fall on the general public.

LABOUR.

The employees of gas undertakings have responded nobly to the call of their country. It would be interesting to know the total number who are now with the Colours. If some of our journals would ask in their columns for returns for the United Kingdom, an interesting record would soon be forthcoming.

We have all felt the withdrawal of so many of our able-bodied men; and if they continue to go at the same rate, we may soon be seriously inconvenienced.

CONSUMPTION OF GAS.

The consumption of gas since the outbreak of the war has varied considerably in different parts of the country. In London, a considerable decrease has taken place, owing to the "reduction of lighting" orders recently issued. The same applies to many towns on the East Coast. In manufacturing districts, however, the volume of business has been maintained; and in towns where troops are billeted, the gas companies are experiencing record increases.

COKE.

Gas undertakings throughout the country, almost without exception, have shown a large decrease in profits during 1914. This has been brought about mainly by reason of the high price of coal, and the unsatisfactory prices realized from residuals—causes almost entirely beyond the control of gas-works' management. The market for residuals commenced to decline in 1913, and continued to do so during the first half of 1914. Most of us commenced the last half year with exceptionally heavy stocks of coke, and the outlook was not promising. It was only when coal became scarce and dear that stocks began to move; and now our yards are clear, and we are unable to meet the demand. How long this demand for coke will last is problematical. It is, of course, due to the exceptional circumstances prevailing at the present time; and I fear that, unless a real effort is made to widen our markets, we will again find our yards full of coke when these exceptional circumstances no longer exist.

Last year, Mr. Glover in his address gave us much valuable information as to the preparation of coke for the market and for increasing its use. We have also had some instructive advice from the London Coke Committee. Just lately there have appeared in the "JOURNAL OF GAS LIGHTING" a series of articles on "The Disposal of Coke and Some Means for Increasing its Sale" by a Gas Engineer; and another series called "Chats on Salesmanship" in the "Gas World." Both of these are written by men who must have given much thought as to the best means for improving and increasing the market for coke. I commend the articles to all those of our members who are responsible for the sale of coke, as well worthy of close study. They cover the subject so thoroughly that I can add very little of value to what has already been stated.

In the purchase of coal and sale of coke, a manager may save his salary to his undertaking, or conversely he may easily cost his undertaking double the amount he receives in cash.

The coke market has always appeared to me to be the more difficult of the two, when making contracts for forward delivery. It has more of a speculative nature about it than the coal market, and consequently more difficult to forecast. While the price of coke usually has some relation to the price of coal, the chief factors governing prices are weather conditions and the price of oil. With a severe winter, the demand for coke for heating purposes is enormously increased; and with cheap oil, we have water-gas plants in action—causing a lessened production and an increased consumption on the works.

The reasons for our having heavy stocks during 1914 are well known; but with coal at a high figure the reasons for the extraordinary sagging in the price of coke are not quite so apparent. Speaking for myself, I can say that our price was adversely affected through the action of certain gas companies in Yorkshire and the Midlands dumping coke into our town. Our market is a fair one; and I have in my mind now an instance of a well-known undertaking in Yorkshire sending coke into our town a few months ago, and causing me to reduce our price by 1s. 8d. per ton. When I tell you the rate for rail and waggon hire from the town I refer to is over 8s., you can imagine the net price realized.

I cannot see that this policy of dumping coke into a district a long distance away from one's works is a wise policy. The only result that arises is that the railway companies are kept busy carrying coke to and fro, and the home producer of coke has to drop his price to preserve his home market. The foreigner has to take a still lower figure; and so the cutting of prices goes on without an ounce of additional coke being consumed.

Our Commercial Sections have done much useful work in preventing this dumping of coke into each other's districts. The members of such sections are usually loyal to each other. But they ought to be loyal to the other sections as well; for assuredly no one section can preserve a fair price if the adjoining districts have had prices broken owing to some of their members dumping coke into the adjoining district. The exchange of information regarding prices and stocks among the various Commercial Sections is now general, and every member of each Commercial Section is in a position to form a fair idea as to prices and stocks throughout England. If all undertakings were members of Commercial Sections, it might be possible to assess a fair value for coke in the different districts, somewhat on the lines of the Sulphate of Ammonia Association. Gas undertakings must realize that co-operation is necessary—co-operation not only in exchanging information, but also in educating the public, so that the use of coke, gas, and sulphate of ammonia may be extended. We ought to a great extent to consider our undertakings as branch establishments of the great gas industry, setting aside a certain sum for advertising and propaganda work, just as in the case of large business establishments.

I am not a lover of "rings" in industries; but it is a suicidal policy for companies or industries to carry competition to such an extent that there is no profit for their labour. Consider, for instance, the present-day working of a large combination of cement companies. In the old days, the various companies would undersell each other, and carry cement into each others districts—paying railway carriage for long distances. Now the cement is drawn from the works most convenient, and railway carriage is reduced to the minimum. This is a distinct economy; and I think that gas companies, without entering into any hard-and-fast agreement on the matter, might take a lesson, and cease this senseless and wasteful system of transporting coke and sulphate of ammonia long distances at sacrificial prices. The enterprising manager who has developed the use of coke in his district, can never hope to reap the full measure of profit to his undertaking so long as less enterprising or inconsiderate salesmen continue to dump surplus stocks out of their own district at a much lower figure than they charge in their own district.

At the present time there is no difficulty in disposing of coke; but the time will come again when production will exceed demand, unless everyone of us uses every exertion to enlarge his local market. We are having a splendid opportunity at the present time for securing new outlets for our fuel. Steam users and maltsters are ready buyers; and I have managed to sell several parcels to two electric supply companies and several maltsters. I trust that their experiments will induce them to become regular users of coke. A real effort ought to be made to re-introduce coke for malting purposes. There never was much reason for the arsenic scare; and many maltsters would use coke if gas-works would take some trouble to ensure that only well-carbonized coke was supplied to them.

I am at the present moment completing a coke-conveying plant, with breaking and screening plant, and hoppers to contain screened large coke, broken coke through 1½ inch and over ¾ inch, breeze through ¾ inch and over ⅜ inch, and dust. There will be shoots from each hopper for bagging purposes, and another shoot at the rear of the platform for loading in bulk. Our demand is largely for coke in sacks; and I anticipate being able to show considerable economy in the loading of coke. We all know the great delay caused to our customers, and the dislocation of our work when a long line of vehicles is waiting to be loaded; men are drawn from all parts of the works to assist in the loading, and much time is wasted in this way. The breaking and screening plant will enable me to cultivate a greater connection with householders, as we will be enabled to sell broken coke at a lower figure than heretofore.

An efficient and economical transport service is essential to the developing of the domestic market. Too often customers on the outskirts of our districts are debarred from purchasing coke from the gas-works on account of the haulage charge. Where gas undertakings own their own vehicles, it is easier to adopt a flat-rate throughout the whole area than it is where contractors do the work at a differential price according to the district in which the customer dwells.

I think it is advisable for gas undertakings to deal as far as possible directly with consumers of coke, instead of allowing the trade to fall into the hands of factors and coal merchants. One means for securing this is to limit the discount allowed to merchants. At one time our discount to merchants was increased to 17½ per cent., on the understanding that merchants were not to sell at less than our advertised price. We found customer after customer transferring their orders to the coal merchants, and ourselves losing 17½ per cent. as a result. It is not easy to prove that such an agreement is being violated, for there are various

ways—either in cartage charge or as a concession on coal purchases—whereby underselling can be carried on. When some of the merchants complained as to the practices of their competitors in taking away their customers who had originally been ours, we thought it time to drop the discount to 12½ per cent., and this has had some effect in regaining our old connection.

Only one more word on this subject. We are indebted to the splendid work the "B.C.G.A." is doing in educating the public in the use of coke. Their literature and advertising matter are excellent; and if we are to cultivate the home market, we must keep on circularizing our customers on every possible occasion. In the quarterly distribution of gas accounts, we have an economical means of distributing suitable literature. We may soon see the day when this department of our business will be developed still further by the employment of an agent or agents who will be paid a commission for securing orders.

SULPHATE OF AMMONIA.

Like the coke market the sulphate of ammonia market is suffering from an ever-increasing production, without a corresponding growth in consumption. When it is realized that the world's production of sulphate of ammonia has increased from 428,000 tons in 1900 to 1,500,000 tons at the present time, it is not surprising that prices have fallen away. The fact that such an enormous production has been absorbed shows a very wonderful development in the use of sulphate throughout the world.

We are faced with still further competition from atmospheric ammonia; and although at the moment we are realizing better prices than during last year, there can be no question that when the war is over, and Germany has to dispose of her accumulated stocks, we shall be faced with a critical situation in the sulphate of ammonia market. It behoves us to take steps to meet it.

The Sulphate of Ammonia Committee have done much useful propaganda work in developing the use of sulphate; but their revenue of 9d. per ton of sulphate compares very badly with the 2s. 6d. per ton subscribed by German sulphate makers.

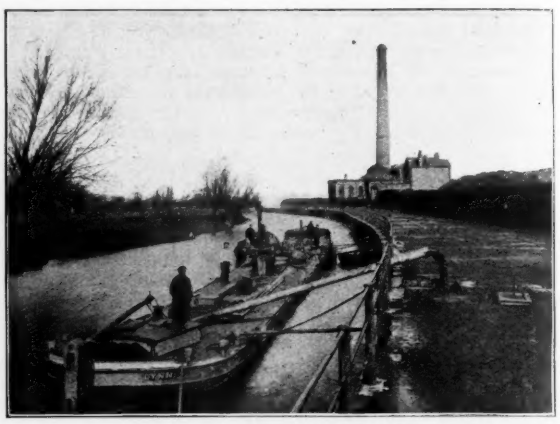
Out of 450,000 tons produced in this country, only about one-fourth is consumed at home. There is here a field for immediate work, if the situation is to be met successfully. We must have the co-operation of every sulphate producer in the country.

The apathy and lack of enterprise shown by some undertakings in this country are very regrettable. They do not support activities that are manifestly working in their interest and securing for them expansion of business and increased profits. We do not manufacture sulphate at Cambridge; but we realize that the Sulphate of Ammonia Committee are working in our interest, and we subscribe to the funds. It is only by every undertaking —no matter how small—co-operating, that the full measure of success can be achieved.

We have recently had the Sulphate of Ammonia Association formed. Its aims were scarcely understood at the outset; and there was a feeling against the duplication of associations and subscriptions, and the controlling of prices. Now, however, that the constitution and rules have been digested, I believe it will receive the support of the most progressive sulphate producers; and in a very short time all will realize that it is to their interest to become subscribers. The subscription is small—6d. per ton. Only four weeks ago, I heard a manager testifying that, through information he opportunely received, he was enabled to sell a parcel at 10s. per ton more than he was inclined to accept, and so cleared his annual subscription and something more.

Very unfavourable comparisons are made by foreign users on British-made sulphate as compared with German sulphate. It is claimed that German sulphate of ammonia does not rot the bags; that it arrives in a dry and granular condition; and that it can be drilled into the soil with no loss of weight. It is stated, on the other hand, that British-made sulphate contains much moisture and free acid; it cannot be drilled into the soil like the German stuff, as it clogs the drills; and it rots the bags. It is evident that, if these statements are true of the whole or part of our export trade, we must mend our ways.

The new Association has (or is engaging) the services of an expert whose services will be available for members who may want advice, on payment of his travelling expenses. This, I think, is the right way to tackle such problems; and it is only by co-operation that the work can be accomplished. I have said that we do not manufacture sulphate of ammonia at Cambridge. We

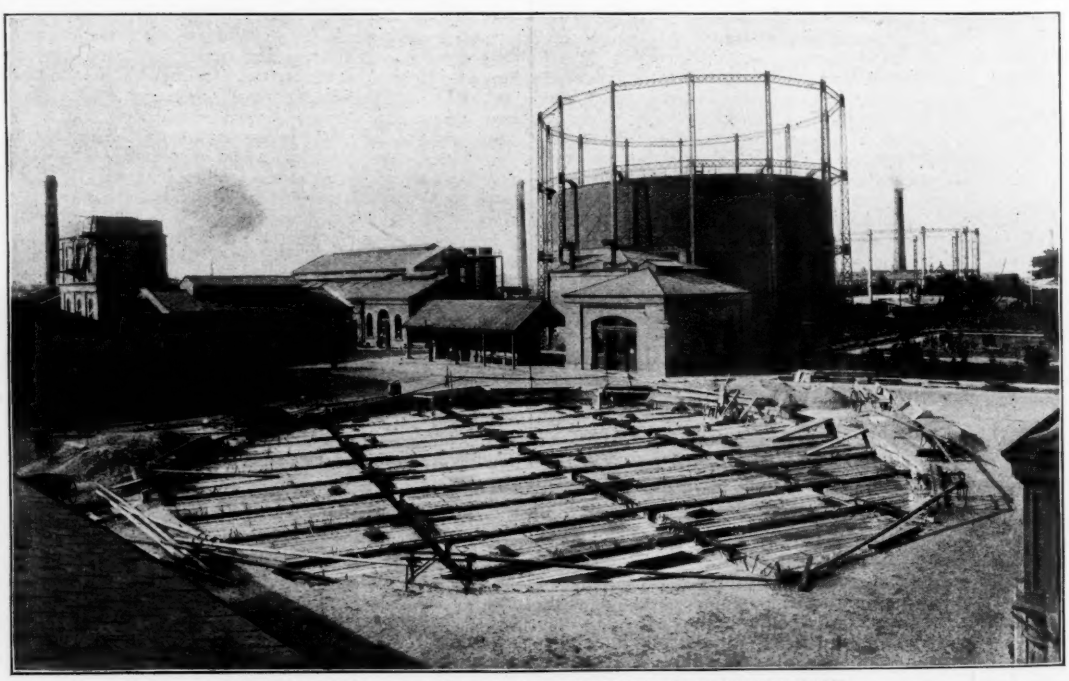


Filling a Tar-Barge at Cambridge.

discontinued doing this several years ago, on account of trouble with the river authorities; and an equitable arrangement was entered into with a chemical works on a sliding-scale depending on the price of sulphate. The surplus tar and liquor are run direct into barges by gravity. The barges contain approximately 50 tons each; and one little tug tows two barges.

TAR.

Although the war has adversely affected the price received for tar, I have not felt this so much as many of you must have done. I am fortunate in being able to dispose of more than half my production for road-making purposes; and I have already booked 200,000 gallons at 2¾d. per gallon for delivery during the coming summer. This proportion might have been exceeded in past years; but storage capacity restricted the amount I was able to reserve for summer delivery. Being dependent on water transit for the transport of tar and liquor, I could not risk filling up my cisterns until February, in case we had a spell of severe frost. This inconvenience we have now been able to overcome. It was deemed advisable to remove an old two-lift gasholder, of 80 feet



GENERAL VIEW OF THE TANK IN PROCESS OF CONSTRUCTION.

New Tar Tank. Actual Cost.

Amount.	Description.	Rate.	£	s.	d.
268 cubic yards	In excavation in tank bottom	4s.	53	12	0
11 No.	,, ,, to footings to piers	6s. each	3	6	0
119¾ cubic yards	In concrete to bottom and piers	14s.	83	15	4
72⅞ ,, ,,	In blue Staffordshire bricks in piers	45s.	164	5	0
245½ lineal feet	Take down 9 feet deep of brickwork all round tank top and clean brickwork to take concrete cover	2d. foot lineal	2	0	11
12 No.	Take down wall 4 feet by 2 feet at 12 points for secondary beam bearing and clean for concrete	4s. each	2	8	0
4 No.	Take down wall 4 feet by 3 feet at 4 points for main beam bearing	5s. ,,	1	0	0
4 No.	Remove and lower padstones	25s. ,,	5	0	0
	Hacking and rendering sides of tank	..	89	10	0
	,, ,, ,, of well	..	11	11	11
1 ton 4 cwt. 17 lbs.	In 44 steel rods in brick piers	£15 per ton	18	2	3
477 cubic yards	In centring to slabs	1s. 7d.	37	15	3
222 ,, ,,	,, ,, ,, secondary beams	1s. 8d.	18	10	0
140 ,, ,,	,, ,, ,, main beams	1s. 8d.	11	13	4
22 ,, ,,	,, ,, ,, bearing girders	1s. 8d.	1	16	8
380 lineal yards	Bevel and moulding to beams	3d.	4	15	0
150 ,, ,,	,, ,, ,,	3d.	1	17	6
52 No.	Cutting holes for air pipes, &c.	3d,	0	13	0
129½ cubic yards	In concrete to slabs 7½ thick	23s.	148	18	6
20 ,, ,,	,, ,, ,, secondary beams	23s.	23	0	0
23 ,, ,,	,, ,, ,, main beams	23s.	26	9	0
6 ,, ,,	,, ,, ,, bearing girders	23s.	7	9	6
23 tons 8 cwt. 2 qrs. 23 lbs.	In steel rods for beams	£13	304	13	2
3500 No.	In fixing loops, &c.	2s. per 1000	3	10	0
	Clearing away and insurance	..	22	11	3
	Total		£1048	3	7

diameter, which stood near to the coke yard, and a retort-house, so that we might have room for a coke-handling plant we are just completing, and at the same time give us floor-space for traffic to the coke yard and coal stores.

It may interest you if I give you a brief description of how we covered in the gasholder tank to form a tar and liquor tank; and as the work was done by a local firm the actual cost might be useful to some meditating similar work.

NEW TAR-STORAGE TANK.

Total capacity.—553,242 gallons.
Diameter.—81 feet.
Height from bottom to underside of beams.—16 ft. 10 in.
Concrete in bottom.—6 inches thick.
Fall of bottom to channel.—1 inch in 5 feet.
Foundations to brick piers of concrete.—6 feet square by 18 inches deep.
Eleven piers of blue bricks.—Reinforced with four rods, 1-inch diameter, 9-inch centres.
Height of piers from top of footings.—16 ft. 7 in.
Sides of tank.—Rendered with 2 : 1 mixture of cement and sand, ¾ inch thick.
The mixed quantities, for the concrete top of tank consisted of 1½ parts of cement, 2 parts of sand, and 4 parts of aggregate.
Main beams.—2 ft. 9 in. deep by 1 ft. 4 in. wide; reinforced with four rods, 1½ inches diameter.
Secondary beams.—1 ft. 10 in. deep by 1 ft. wide, reinforced with five rods 1½ inches diameter.
Slabs.—7½ inches thick, reinforced with ½ inch diameter rods, 4 inch centres.

The stand-pipe well adjoining the tank is 23 feet deep by 7 feet diameter. The outlet and inlet pipes have been cut off inside the tank wall and inside the stand-pipe well. A channel has been made from the lowest point in the floor of the tank to the pipes leading into the stand-pipe well. This allows the tar to drain into the well, and become a tar reservoir, into which the suction pipe of the tar pump is placed. The tank has a small cover over the delivery pipes, to enable them to be got at when necessary. The well also has a similar cover over the suction-pipe entrance.

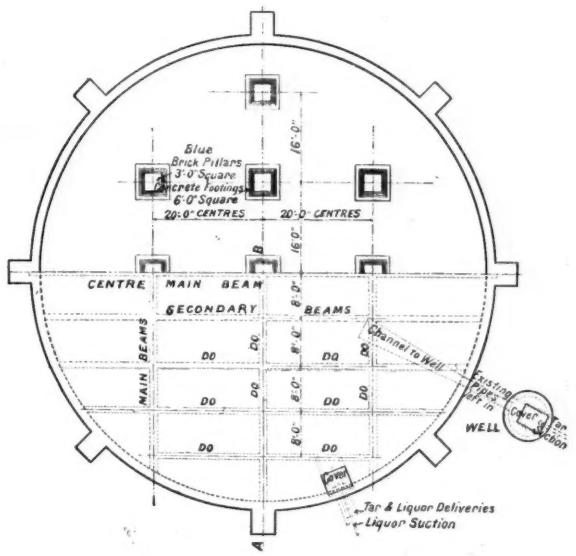
TAR PRODUCTS.

Tar is at the present time occupying a prominent position in the public mind. It is being utilized for the production of toluol; and although the efforts of those of our members who are producing toluol are not likely to result in much profit to their undertakings, it is pleasant to think that our industry is able to render such an essential service to the Government.

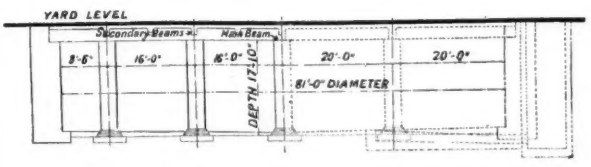
The production of aniline dyes is another subject which is engaging much attention at the present time. Many of us who have taken an interest in the proposal for our country to recapture this industry must have read with mixed feelings the debate in the House of Commons on the national scheme, and to learn that after seven months' war we are still dependent on Germany for our dyes.

CAPTURING GERMAN TRADE.

The agitation in the public and technical Press throughout the country for our manufacturers to go in and capture German trade is like telling a dog to jump into the water and fetch out a stick.



Plan.



Section on AB. Elevation.

New Tar-Storage Tank at Cambridge.

To my mind, it is not the simple matter many people assume it to be. We may capture the trade now, but we will not retain it in peace time, unless we adopt German methods of:

(1) Training and educating our experts.
(2) Organizing and training our workmen.
(3) Improving our methods for merchandizing products.

It is difficult to make a comparison for different manufactures between our exports and those of Germany, as the returns are not published quite in the same way for the two countries. Some figures were, however, recently given by a research student in economics; and as they are interesting, I will take six manufactures where Germany shows a considerable increase in exports over the United Kingdom and shows the export balance calculated by deducting the total imports from the exports, and presumably

represents the amounts left over after home requirements have been satisfied.

(1) Iron manufactures (1912 trade) (excluding machines and pig iron). In thousands of pounds.

	Exports.	Imports.	Balance.
United Kingdom	40,268	10,391	29,977
Germany	51,900	4,016	47,884
Difference between German and U.K. "balance,"			£18,007,000

(2) Chemicals (1912 trade).

United Kingdom	22,567	12,545	10,022
Germany	38,700	11,878	26,922
Difference			£16,900,000

(3) Glassware (1912).

United Kingdom	1,892	3,281	− 1,389
Germany	5,976	(negligible)	5,976
Difference			£7,365,000

(4) Toys and games (1912).

United Kingdom	890	1,350	− 460
Germany	4,613	(negligible)	4,613
Difference			£5,073,000

(5) Musical instruments (1912).

United Kingdom	647	1,020	− 383
Germany	3,900	(negligible)	3,900
Difference			£4,283,000

(6) Books, maps, engravings, and lithographs (1912).

United Kingdom	3,491	962	2,529
Germany	4,906	(negligible)	4,906
Difference			£2,277,000

Now what are the factors explaining Germany's large export balances, as compared with the United Kingdom, in these particular trades? One of our leading firms of glass manufacturers to whom I wrote on the subject, says: "No doubt, material and fuel are obtained much cheaper on the Continent than in this country, and labour also is cheaper. Many years ago the bulk of the cheap glass for lighting purposes was made in Birmingham and Dudley; and a much larger number of hands were employed in this particular trade than are now employed all through Great Britain. However, we think most manufacturers are now striving hard to capture some of the Continental trade. This firm is capturing a good bit of trade which it previously had in the way of lighting many years ago."

Another glass manufacturer informs me that he was so hampered by the Glass Workers' Trade Union that he closed-down one of his works after having gone to much expense in discovering German secrets in glass manufacture. He further says that many men who formerly earned £3 to £4 per week are now working as unskilled labourers.

An article in the "Morning Post" of Aug. 26 contained this report of a conversation with a partner in a large wholesale firm, giving reasons for Germany's large export balances in various trades: "In the first place the German Government have established the system of giving bounties to encourage the manufacture of certain classes of goods. Then there is the well-known fact that the German workman earns less wages, and works longer hours, than the British workman; and the German manufacturer is less hampered by statutory restrictions of all sorts, such as tend in our country to swell the standing expenses which are such a burden to business enterprise."

I do not know how far the above statements are correct; but they are well worth the serious consideration of everyone in this country.

The wages of workmen have been going up by leaps and bounds; and it is evident that, unless the wages of German workmen increase at approximately the same rate, and their statutory restrictions are at the same standard, the Germans will again undercut us, and our prosperity will diminish. That the workmen of this country realize this, is hard to believe. The recent strikes on the Clyde and elsewhere make every patriotic man and woman blush, and feel ashamed that at this time of stress—when thousands of our men and women are giving freely of their wealth and blood and dear ones in the service of their country—those men should be so indifferent to the interests of their country as to refuse to work because they know their work is necessary, and they think they can command a few more shillings per week.

The question of bounties on exports raises an exceedingly debatable question. It is doubtful if it has benefited German trade on the whole; for the rate of growth in the two countries for the ten years between 1902 and 1912 does not show a balance in favour of Germany.

	Exports. (Of all kinds of manufactured goods.)	Imports.	Balance.
1902—			
Germany	151,900	54,200	97,700
United Kingdom	244,000	133,300	110,700
1912—			
Germany	295,400	103,000	192,400
United Kingdom	414,000	185,400	228,600

At the same time our Government should closely watch all attacks on our markets. We cannot any more see our industries overwhelmed one after another by means of bounties or subsidies, than we could allow our trenches at the front to be overthrown one after another without support.

To my mind it would only have been necessary for Germany to have continued her organized attacks on our industries for her to have outstripped us in many more trades than the six I have cited.

I think a speech recently made by Sir William Ramsay, and reported in "The Times," is well worth quoting.

"Sir William Ramsay said the reason of the war was the existence in the Teutonic mind of an ideal entirely different from that in the mind of other races. German methods in trade had, as far as possible, been identical with German methods of war. It was the bringing of the heavy machinery of the State to bear on the minutiæ of commerce that made it impossible to compete with the German. Much nonsense had been written about the lack of able young British chemists. There was no such lack; but owing to the unfairness of German competition, a British manufacturer did not, as a rule, care to risk capital. The English competitor was at a disadvantage owing to systematic fraudulent attacks; for no redress had been obtainable. Very similar methods had been employed also in regard to shipping. Of late a new factor had appeared. The German Imperial Chancellor had made his remark about a scrap of paper; and the breach of faith with Belgium had the approval of the whole German people. Did Germans realize that it meant that no treaty with them, political or otherwise, was worth the paper it was written on, and that they had forfeited all claim to trust. Germans had made many blunders; but this blundering crime was surely the culminating point. At the end of the war, this country would again have to face Germans as trade rivals. If there was a German state, she would back her traders again; they would again steal our inventions, and use trickery and fraud to oust us from the world's markets. The situation called for early deliberation and well-thought-out and firm action; and it must be action taken as a nation through the Government."

Now while I think that much of the success of our trades depends on the state and on the leaders of our trade unions, I think that still more depends on the training of our producers and our business men. In this country we allow our craftsmen to "pick up" their trade, whereas Germany teaches him thoroughly in a school. It is mainly through this teaching and research work that Germany has made such rapid strides. This contention is supported by the following quotations.

"The Times," on Oct. 7, dealing with the Glass and Pottery Exchange, said:

"In the specimens of crockery which have been collected, one is at once struck with the beauty of colour and design shown. The German manufacturers have not hesitated to employ good artists and designers; and it is evident that if British firms are to succeed in making their goods as acceptable to the market, they must do the same."

From all sides comes the complaint that the English producer adopts the "take it or leave it attitude." This attitude may be due to indifference on the part of the manufacturer as to whether he gets new customers or not, or he may not wish to depart from what he considers his superior standard. The "Grocery Journal" of September, in its editorial, says:

"The reason why Germany has in the past captured so much export trade is because she has been willing to give the purchaser what he wants and is prepared to pay for, and not what he thinks he ought to want."

"The Times," Aug. 25:

"Every business-man has had experience of the difficulty of getting from British printers prompt and exact quotations, artistic and tasteful work, efficient execution, and delivery to time."

The "Morning Post," Aug. 21, said:

"In the past the Germans have captured markets owing to the slow delivery of orders by the English manufacturers. Another factor which has acted against the home producer has been their apparent disinclination to study the needs of customers."

"The Times" for Sept. 22, remarked:

"Complaint is also made that catalogues and price lists are usually in English, and deal in English coinage, weights, and measures, whereas German firms quote simplified and inclusive rates in French money combined with metric figures of weights and size."

I might give you many other quotations reflecting on our methods in this country; but I fear to weary you with what is not of technical interest to us as an industry, and only concerns us indirectly, as participating in the prosperity or otherwise of our country.

SAFETY APPLIANCES IN GAS-WORKS.

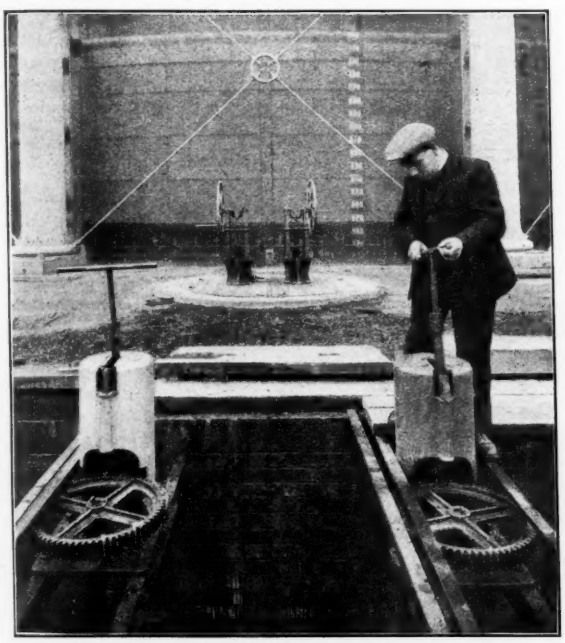
It is an exceedingly rare occurrence to read of any interruption to, or failure of, the gas supply throughout the country. Considering the nature of our product, with all its potentiality for causing trouble, this is a remarkable achievement. This regular and trustworthy supply of gas has not been attained by chance or casual methods of manufacture and distribution. On the contrary, a modern gas undertaking possesses some of the most wonderful and clever inventions that can be found in any industry. Right from the retort-house to the gas appliances in the consumers' houses, we have hundreds of clever devices which have been invented and perfected by generations of practical gas engineers and makers of gas appliances. It is, therefore, as a result of much experience, thought, and ingenuity that the manufacture and supply of gas to-day is so immune from accident, inconvenience, and interruption.

Experience and circumstances vary in different works; and it would be interesting to tabulate the many methods in practice—say, for ensuring non-failure of the gas supply between the gas-works and the district. There are many methods installed that are excellent, but in some gas-works no safeguards have been adopted, and workmen are entrusted to open and shut valves

which if worked improperly might plunge the town or district into darkness.

Some years ago a momentary lapse on the part of one of our workmen, who had acted as valve-man for many years without mistake, demonstrated the liability of the human element to make mistakes. With a view to preventing a repetition of this mistake, which might have proved disastrous, I approached one or two firms and found that an arrangement such as I suggested was already made by a firm. The inventor, it appears, was Mr. James Hewett, the Distributing Engineer to the Birmingham Gas Department. I have not had the pleasure of making the acquaintance of Mr. Hewett; but I am pleased to have this opportunity of testifying to the efficiency of his device.*

Briefly the arrangement is that with (say) two or three or more gasholders, one valve-key is locked up or placed in the custody of some person other than the valve-man. There is a cast iron cover or hood placed over the valve. In the side of the hood there is a slot through which the key passes when the valve is open. As the valve is closed, a bar covers the slot, and so prevents the key from being removed until the valve is again opened.



Hewett's Attachment for Interlocking Valves.

The inlet keys are of a different design from the outlet keys; and they are not interchangeable. It will, therefore, be seen that there must always be one valve open unless the spare key is procured from the person under whose charge it is placed; and before a valve can be closed, another valve must be opened to get a key to do so.

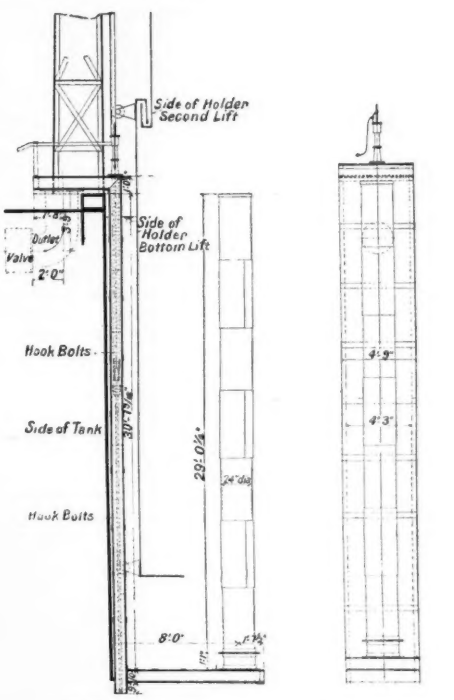
The arrangement is what may be called fool-proof, and all the holders cannot be shut off, either mischievously or by accident at any one time. There is, of course, the possibility of a holder being allowed to take the ground; and to guard against this contingency we have connected a safety governor between the inlet to the district governors, and the inlet pipe to the holders.

This governor is set to come into action a few tenths below the minimum pressure given by the lightest holder. If, therefore, the holder supplying the district was allowed to become empty, the safety governor would come into action when the pressure fell to that at which it is set, and it would supply the district from the make and through the inlet pipe of the holders. No doubt the pressure given would be a reduced one, but it would at least prevent the total extinction of the lights on the district before the mistake was rectified. The governor is tested weekly to ensure that it is free in its action.

No gas manager can afford to take the slightest risk; and when an engineer recognizes the possibility of a mishap through any agency, he should not rest until he has done all he knows to safeguard the weakness. Whatever is possible happens some day, and generally when least expected.

RECTANGULAR OUTLET-PIPE INSIDE THE GASHOLDER TANK.

Having had occasion in 1908 to replace a single-lift holder with a three-lift one in a tank the walls of which were rather thin, I decided not to interfere with the walls by enlarging the mains; but, instead, I connected the two 14-inch pipes by means of a Y piece outside the standpipe well to the 18-inch inlet pipe, and provided a new 24-inch outlet, placed inside the tank wall. As I have not seen the arrangement elsewhere, I show a sketch of the manner in which this was done. It may prove useful to some engineer who is reluctant to cut the walls of a tank, and if he has space between the holder and the tank to fix such a rectangular outlet.



Side Elevation. Front Elevation.

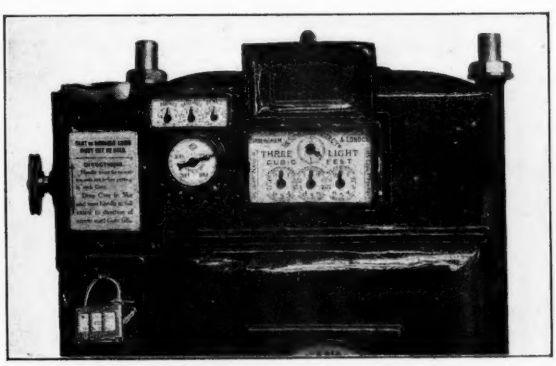
Arrangement of Gasholder Outlet.

COIN-INDICATORS ON SLOT-METERS.

The slot-meter of to-day is a much simpler and more reliable instrument than were most of the earlier varieties. It is still, however (and I am afraid always will be as presently constructed), liable to small differences between the money inserted and the registration shown on the index. Also, the price of gas per 1000 cubic feet is rarely at such a figure that it represents a multiple of the number of feet sold for a penny. The meters accordingly have to be underset, and usually there should be a surplus to be handed back to the consumer at each collection. There is here a considerable temptation for petty pilfering by slot-meter inspectors. It is rare to read of dishonest meter inspectors; but such cases are not unknown even if the delinquents are not prosecuted.

Some companies have fairly effective supervision, and others, by means of calculating the shortage or overplus of their inspectors, are able to discover if any one man shows exceptionally low returns. Again, by moving inspectors round different districts, companies are frequently enabled to detect consistent pilferings by one employee through the regular shortages in cash of his successor. It is our duty to the men that there should be no temptation to dishonesty placed in their way if it can be avoided.

I have had in use for a number of years a very simple mechanical coin indicator attached to all new slot meters and meters sent for repairs. As I consider it a positive check, I think it worth bringing to your notice. There is nothing novel in the arrangement. I believe it was tried by some company many years ago and discarded; but I have never discovered for what reason.



Sutherland's Coin-Indicator for Slot-Meters.

The object of the coin indicator is to register the number of coins that the consumer puts into the meter; and it checks the honesty of the collector, as also the accuracy of the measuring mechanism. When a penny is inserted in the slot, and is being conveyed to the money-box, it not only opens the automatic

* An article (fully illustrated) descriptive of the arrangement here referred to, appeared in the "JOURNAL" for Feb. 10 last year, pp. 352-3.—ED. J.G.L.

valve but a lever arm which is attached to the ratchet of the coin register, and comes in contact with the raised portion on the price-changing disc. The lever arm mounts the raised portion, and operates the ratchet—one tooth representing one penny. This is registered on the right-hand dial of the coin-index. Upon the return of the coin-carriage to the first position—*i.e.*, opposite the slot—the lever arm is brought back to its original position ready to perform the same operation again. The index of the coin-counter shows pennies, shillings, and pounds up to five pounds. When five pounds has been registered, the whole of the hands are at zero.

The meter inspector registers in his book the coin index, meter index, consumption, and money in box. If the money in the box does not agree with the coin index, the matter is at once investigated; for you will readily see that the index cannot move without some disc having been inserted to engage the mechanism, and the coin or disc should be in the box.

SALE OF GAS ACT.

While on the subject of meters, I may say that it has always appeared to me to be unfair for gas companies to be penalized 1 per cent. under the Sale of Gas Act. A meter is stamped as correct if it registers not more than 2 per cent. against the consumer or 3 per cent. against the gas company. This Act dates from Aug. 13, 1859, and is almost word for word the same as in a Bill presented by Lord Redesdale, amended on report and ordered to be printed on July 12, 1859, with the exception that Lord Redesdale's Bill allowed a variation of 2 per cent. either way. Why gas companies should be penalized by 1 per cent. I am unable to imagine. The margin should be equal to both parties—whether 2 or 3 per cent. As long as the Act remains as it is, I think it is a good plan for gas managers to see that all new meters are tested before going out on the district, to ensure that they are not set at the limit of 3 per cent. slow, but as nearly correct as possible. Very often a railway journey will be found to have upset the registration somewhat.

EDUCATION AND EXAMINATION OF GAS-FITTERS.

This scheme has now been successfully launched, under the auspices of the City and Guilds of London Institute. The practical examination has already taken place; and the written examination will take place on April 26.

Most of the members of this Association have for many years taken an active part in the education of their gas-fitters, although the necessity for examination and granting of certificates has not been admitted by all of them. An examination is a logical sequence, in any class for educational purposes, whether the class is a private one or under some educational authority; and I believe that the syllabus as now drawn up by the City and Guilds Institute will satisfy most of our members who had a natural objection to the granting of certificates to any workman who was not first a thoroughly practical tradesman.

The syllabus states that in Grade II., "until after the examination of the year 1916 candidates may take the examination in Grade II. without having previously passed in Grade I. But, if so, they must produce evidence that they have served a three years' apprenticeship to the trade." In the Final Examination, "candidates must hold a certificate for Grade II., or until after the examination of 1916 must produce evidence of their having served at least four years' apprenticeship to the trade."

I take it that after 1916 evidence will still be required to prove that candidates have served three or four years as apprentices. The point is not quite clear from this year's syllabus; but it is a very necessary provision. What we have to bear in mind is that we are trying to train our young gas-fitters to be better educated and more skilful tradesmen than their predecessors. I believe that more importance will be attached to the gas-fitters' certificate than to that for gas supply for foremen and inspectors, because of the apprenticeship which the holders must have served.

I should like to see the day when every man connected with the distribution department will have had some practical and theoretical training in gas-fitting—more especially collectors and meter inspectors. These employees ought to be the fingers of the undertaking on the pulse of the consumer—reporting the possibility of new business, what is necessary to retain existing business, analyzing complaints, and stating fully and exactly what is required to be done with materials required, so that a journey is saved for the outdoor inspector or fitter. And yet how rarely do these members of our staff rise to the occasion, and prove themselves as valuable and zealous as they might be in the interest of the undertaking. Some collectors are little better than automatic door-knockers; and I venture to think it would be to the advantage of most undertakings to have gas accounts and call notes issued by the office staff and delivered by lamplighters; the money spent on collectors being utilized for canvassers. It is surprising the amount of business a really capable outdoor representative can secure by interviewing builders and meeting the new tenants of houses. It would appear from American literature that gas supply companies there are far ahead of us in many of their salesmanship methods.

I am glad to know that the "B.C.G.A." is proposing to organize conferences of gas-works' employees engaged in the sales department of our undertakings, and that Mr. Mason is prepared to deliver addresses on the subject of salesmanship. This is another step in the right direction. At the present time, with depleted staffs, we may not be in a position to take up the suggestion as we should

CAMBRIDGE
GAS-LIGHT AND COKE COMPANY.

Scale of charges per annum for Gas-Light.

SIX DAYS A WEEK FROM DUSK TILL THE HOURS BELOW MENTIONED,

The payments to be made quarterly and as follow:

	NINE O'CLOCK.		TEN O'CLOCK.		ELEVEN O'CLOCK.	
	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.
Small Argand Burner.	2. Winter Qrs. each	1 7 0	2 14 0	1 11 6	3 3 0	1 16 0	3 12 0
	2. Summer ditto	0 3 0	0 6 0	0 2 9	0 5 6	0 2 9	0 5 6
	Total per annum		3 0 0		3 8 6		3 17 6
Large Argand Burner.	2. Winter Qrs. each	1 16 0	3 12 0	2 2 0	4 4 0	2 7 6	4 15 0
	2. Summer ditto	0 3 6	0 7 0	0 4 6	0 8 0	0 4 6	0 9 0
	Total per annum		3 19 0		4 12 0		5 4 0

*** One Sixth extra to be charged for all Lights used on Sundays.

Colleges, Private Houses, Inns, and for all Situations in which the Gas is burned to irregular periods, to be charged as until Eleven o'Clock, or by a special agreement.

Ten Feet of surface pipe will be laid at the Contractors expence; all extra length will be charged Eighteen-pence per foot.—An experienced Fitter has been appointed to furnish all interior Fittings, of whom it is required to execute the work at the lowest charge.

[TURN OVER.

REGULATIONS.

1. In no case can the Gas be supplied without a glass over each Argand, and none but the straight chimney glass should be used. The flame of the Burner must not exceed three inches in height, as when this is not attended to, the brilliancy of the light is diminished.

2. The lights to be extinguished within quarter of an hour after the expiration of the time for which they were taken, except on Saturday nights, when the burning may continue one hour extra, without additional charge.

3. Should the appertures of the Burners be wilfully widened, the supply of Gas will be discontinued till replaced by new ones, to be paid for by the parties offending; but if any one is detected a second time in this practice, the Contractor must, in justice to himself, discontinue supplying them with Gas altogether.

4. On a refusal to pay the rent one Month after it becomes due, the supply of Gas will be stopped, of which three days notice will be given.

JOHN GRAFTON,
Contractor.

Orders or enquires sent to the new Gas Works, Barnwell, or left with Mr. Richard Newby, Bookseller, Trinity-Street, will receive immediate attention.

Copy of a Certificate from several Gentlemen who have lighted their Private Houses with Gas, at Stamford; in nearly all of them instances the lights have been adopted in the private appartments, generally, and in several of them it is extended to the Bed-Rooms.—

Stamford, March 9th, 1826.

"We, the undersigned, have introduced into our Houses, Offices, and other premises, as might be, the Coal Gas as Manufactured by Mr. Grafton, at the public works of this place; and can conscientiously declare that it is very pure, sweet and brilliant; that it is utterly divested of smoke or unpleasant smell, or effluvia; and has proved, after twelve months use, in the Drawing-Rooms and best appartments, to be not in the least degree injurious to furniture; moreover, that if used with due care and economy, the consumption of it is by no means extravagant"

Wm. BAILEY	ROBERT NICHOLLS	SAMUEL JUDD
J. TORKINGTON	ROBERT HUNT	J. RODEN
RICHARD TURNHILL		

W. Metcalfe, Printer, Trumpington-Street, Cambridge.

like; but I am convinced that a course of instruction on scientific salesmanship for our show-room attendants and outdoor representatives will be of infinite benefit and profit to all gas undertakings whose employees participate. If the employees have a sound practical training as a foundation, they are bound to profit by specializing in their particular departments.

ELECTRIC COMPETITION.

Sir William Ramsay's strictures on Germany's methods of business would not be inappropriate if applied to the manner in which some electric undertakings secure business. That these methods are illegal has been demonstrated by the Long Eaton case. It is not always easy, however, to produce evidence of preferential treatment having been given by electric undertakings. An electric supply company with which I am acquainted secured a very fair amount of business by giving an unrestricted supply of current for five lamps at 8s. per quarter, and by supplying buildings at a contract price, irrespective of the amount used. It is not surprising that a favourable increase in the output of current was reported, nor is it surprising that the chairman of the company in his remarks to the shareholders last month stated that a lower average price per unit sent out had been realized. It only requires a large augmentation of business on such terms to spell disaster. Already I believe customers are having their attention drawn to the wastefulness that is going on, and new tenants are having the rate for five burners increased to 10s. per quarter, or £2 per annum.

It may be of interest to you if I show you a card issued by the first Cambridge Gas Company. It contains a scale of charges for large and small argand burners for different hours and for the different quarters. I believe inspectors were employed as a check on the honesty of the consumers; but none of you will be surprised to learn that no dividend was paid, notwithstanding the watchfulness of the inspectors.

I have already taken up much of your time advocating the education and training of all employees engaged in industry. In no department of the gas industry has the general improvement of the *personnel* been more marked than in the management. Competition in almost every branch of our business has made the present generation of managers infinitely more progressive and enterprising than our predecessors; and the younger generation will be still better trained and equipped for carrying on successfully the extensive business built up during the past hundred years. I hope to see the day when it will be the rule and not the exception for managers of medium and large sized gas undertakings to hold degrees in engineering and science.

The "Livesey Professorship and the Gas Research Fellowship" at Leeds are already showing good results in this direction, and the munificent gift of a scholarship to the same University by one whom we are honoured in having as one of our members, Sir Corbet Woodall, will do still more to increase the knowledge and improve the status of those who will be to a great extent responsible for the success of the industry which he has loved so well and with which his name has been so long identified.

COKE, COAL, AND TOLUOL.

Mr. EDWARD ALLEN (Liverpool) said it fell to his pleasant lot to propose a vote of thanks to the President for his excellent address. The President, as the members knew, came from a famous seat of learning; and he had exhibited to them an interesting trophy from one of its coffers. His charming personality alone made them feel proud of their President. He had taken them through a very long range in his address. He had given them topical subjects; and, in the earlier part of the address, he had dealt with commercial questions, which were really of the highest importance. They had listened to his words of wisdom with much satisfaction and agreement. He had taken them on to the supply department, and had closed with a few words of reference to their electrical competitors, whom he classified as rather German in their methods. He (Mr. Allen) would like to refer to some of the points the President had raised. The question of coke was one which gas engineers were discussing this time last year in a very sad manner. Now the scene had changed. He (Mr. Allen) could not help referring to a corporation managed undertaking that was charging 8s. 4d. as its yard price last year, and to-day was charging 18s. 4d. The 8s. 4d. was no doubt a price that enabled those in control to dispose of their coke, but at the cost of their neighbours. He presumed that, stock having got low through their improper methods, they were not able to take advantage of the present market from the point of quantity, and so they were now engaged in spoiling their own future market by putting on an excessive price. His view was that this was an opportunity of gaining connections for coke sales. He himself had received a letter asking for a price for a supply of coke over twelve months—100 tons per week; the writers having thought of using coke in place of coal. This was a very good opportunity. He (Mr. Allen) had quoted an excellent price, but not at all a war price; and he hoped that this business would be obtained by the Company, and so help them to keep out of difficulty with stocks next winter. With respect to coal, they sympathized with each other at losing stocks, and having to pay higher prices for coal in the future. He, however, was personally fortunate. His Directors had purchased nearly all the coal he wanted for twelve months without paying much more for it. He would suggest to members not to be in a hurry to go into the coal market. The colliery people were making money out of gas undertakings that must buy for delivery in the next few months. If gas undertakings held their hands for a little while, the colliery people would find themselves in a position to seek their business; and then there would be a chance of a reasonable price. There must be an advance because of additional costs; but it must be a reasonable advance. Only the previous week, a deputation had a friendly hearing by the President of the Board of Trade with regard to the difficulty of obtaining coal supplies for gas and electrical undertakings; and he for one was very sanguine the Government would take such steps as would make the traffic freer than it had been the last few months. If the Government should take the step, too, of limiting the export of gas coal, this would assist in helping them to supply the people with gas at a reasonable price. They were very hopeful of the results of this interview with Mr. Runciman. The last point was the matter of toluol. Mr. Glover was good enough to refer to the fact that Liverpool was not too far away for one member of the Association to be present there that day. He (Mr. Allen) probably ought to explain that he was fortunate in having business in London on the date of the meeting. Some friends smiled as if this was arranged for. It was true, however, that he had been very fortunate. He had that day come to London to see their friend Dr. Colman on the question of toluol. They were to have plant erected for the Government at Liverpool for the purpose of extracting toluol from the finished gas; and in this connection Dr. Colman had been rendering very able services to the Government and to the gas industry. They were all anxious to assist the Government in this time of war. At the same time, while they put the nation's need first, they had asked the Government to consider that the gas industry had some claims upon them as representing the great public. In this matter of toluol, they were all willing to do their best to use their works so as to enable the Government to prepare ammunition to overcome their unscrupulous foes, and to bring to an end a war which bore so hardly upon them as an industry and upon the whole nation.

Mr. A. E. BROADBERRY, in seconding the motion, said that, although many of them might have had some difficulty in leaving their works at the present time, they had been fully rewarded by the President's address.

The motion was heartily adopted.

MAY MEETING AT CAMBRIDGE.

The PRESIDENT said he thanked Mr. Allen and Mr. Broadberry very much for the kind words to which they had given expression; and the members for their approbation. It appeared from Mr. Livesey's remarks that he rather thought he (the President) had no connection with the Southern district. In the old days—Mr. Shoubridge's presence reminded him—he had the pleasure of serving three years in the South Suburban Company, so he had a very warm corner in his heart for the Southern district; and he was proud to have the honour of now being the President of the Association. His Chairman and Directors had desired him to give the members a very cordial invitation to hold their May meeting at Cambridge; and he, needless to say, had much pleasure in doing so. [Applause.]

Mr. F. W. CROSS (Lea Bridge) said they could hardly do otherwise than to put on record their thanks to the Chairman and Directors of the Cambridge Gas Company for the invitation they had extended to the Association to visit their works. Some of them had been to Cambridge several times; but he thought they could go there many more times with profit and interest.

Mr. C. W. OFFORD (Enfield) seconded the motion. He knew the proposal to visit Cambridge would be accepted with acclamation. Instead of being tired of visiting the town, they could say in the words of the hymn—

> "I have been there,
> And still would go."

The motion was cordially passed.

The PRESIDENT, on behalf of his Chairman and Directors, acknowledged the vote.

The members before separating had tea together.

Arrangements have been made (by permission of Mr. A. L. Jennings, the Engineer) for the members of the Yorkshire Junior Gas Association to visit next Saturday the Cleckheaton Gas-Works, which are of entirely new construction, and include an installation of vertical retorts.

It has already been announced in the "JOURNAL" that Mr. A. G. Vernon Harcourt, D.Sc., F.R.S., one of the Metropolitan Gas Referees, would read a paper, at the Royal Society of Arts, "On an Economical and Smokeless Grate, and on the Measurement of the Efficiency of Open Grates." We learn from the current number of the Society's "Journal" that the paper will be read at the ordinary meeting on the 5th of May.

According to a recent issue of the "American Gas Light Journal," some hundreds of skilled men in the United States are devoting their energies to the production of coal-tar colours, and there is every reason for believing that some commercial processes will be evolved by them. About the last to join the ranks of these investigators is Mr. Thomas A. Edison, who is reported to be building a benzol-recovery plant of his own design at Johnstown (Pa.), adjoining the bye-product coke-ovens of the Cambria Steel Company.

MIDLAND ASSOCIATION OF GAS ENGINEERS AND MANAGERS.

The Annual General Meeting of the Association was held at the Grand Hotel, Birmingham, on Thursday last. Mr. W. J. Rendell Baker, of Mansfield (the President), was in the chair. There was a somewhat meagre attendance of members.

The Secretary (Mr. W. G. S. Cranmer, of Willenhall) read the minutes of the autumn general meeting, which were confirmed and signed. He also read apologies of several members for absence, and added that a few days ago he received a letter from Alderman W. R. Cooper, of Banbury, who stated that he was not allowed by the doctor to leave the house.

Report of the Committee.

The Committee, in their report, summarized the proceedings at the three meetings of the Association held during last year—on Feb. 26 at Birmingham, May 27 at Mansfield, and Oct. 29. At this last-named (Birmingham) meeting, it was determined that the Committee of the Association should remain in office for another twelve months.

The Committee also reported that classes for gas-fitting have been started at Birmingham, West Bromwich, and Wolverhampton Technical Schools; and they have every hope of the extension of the work to other centres in the future.

They notified the election of Mr. R. O. Paterson (formerly of Cheltenham) as an Honorary Member of the Association.

The Committee reported with regret the deaths of Mr. Chas. Meiklejohn, of Rugby, Mr. T. Cross, of Cannock, Mr. E. Jones, of Burslem, and Mr. A. Cooke, of Oldbury.

During last year fourteen new members were elected, four died, and six resigned; the membership now being 115.

Mr. J. Ferguson Bell (Derby) proposed the adoption of the annual report and accounts. He spoke of the satisfaction which he was sure all the members felt at the fact that the President and the other officers had agreed to retain their positions for another year. He was sure that 1914 and 1915 would be memorable years in the history of the whole country, and they were not years which lent themselves either to the reading or the discussion of papers, for there was no doubt that at the moment all the members were very much absorbed in their own industries. Many of them could not, of course, go to the front; but they had nevertheless "done their little bit" at home to keep things going. The Association continued in a thriving condition. The membership had increased slightly; and the balance in hand was a substantial one. During the past year they had had several very interesting and instructive meetings. He asked the Secretary to convey the sympathy of the meeting to those members who were unable to be present, through illness.

Mr. W. C. Jones (Brierley Hill) seconded the motion, which was passed.

The Commercial Section and Revised Rules.

Mr. Bell also moved the adoption of the report of the Commercial Section, and the acceptance of the revised rules. The section, he explained, was started with twenty-seven members at the beginning of 1914; and during last year there were ten additions to the membership. All the members of the Midland Association were eligible for membership of the Commercial Section; and as there were about 100 members of the Association, it was to be hoped it would not be long before the numbers in the Commercial Section were considerably increased. Membership of the Commercial Section must be a source of benefit not only to those who joined it, but to the undertakings they represented. It was well known that, at the present time, there were combinations in practically all trades; and, whether they liked it or not, they had to face the fact. Therefore it was necessary in their own interests that they should combine, and as far as possible protect the gas industry. The value of the Association was conspicuously indicated once or twice during last year. When war broke out many of the large contractors for their ammoniacal liquor intimated to the managers that, in consequence of the war, they were unable to take any supply. This was a position which they, as gas companies and corporations, felt was not a reasonable one. It meant that they were to take the whole of the risks, and that those who had contract obligations were not in consequence of the war to suffer in any respect. They had several meetings in Birmingham, and came to the unanimous conclusion that, unless there was a war clause in the contract, they were justified in asking the contractors to carry out its terms. The result was that they all decided that they would carry out their contract obligations, which, of course, considerably relieved the situation. Another matter was with regard to tar. Pitch having become almost unsaleable owing to the war, the position in the tar market was a very serious one. There was enormous depreciation in the price of pitch. Several meetings were called with a view to enabling them to hold the pitch so as to obtain a fair market value. After a number of meetings, it was found impossible to go to the tar distillers and coke people and get them to join; and it was also felt to be impracticable for gas undertakings to buy up pitch and keep up the market price. The result was that, after several meetings, they came to the conclusion that nothing could be done. They accordingly advised the members that the best plan was to make their own arrangements. The question of coal contracts had also been before the Association at several meetings, when it was pointed out that the members thought they were entitled to a reduction of something like 1s. 6d. per ton. He believed most of them secured this reduction, and he thought it was in consequence of the action taken by the Association that they were enabled to get so good a concession. The other matter, which was a very difficult one, had reference to the sale of coke. The idea was to come to an arrangement whereby they would avoid sending coke into each other's districts, to the detriment of one another. Last year they were all in a very awkward and difficult position, because of the enormous stocks of coke in the country. Trade was bad, and the stocks were growing mountains high. They pointed out to members the great importance of encouraging the sale of coke in their own districts, and as far as possible avoiding trenching upon one another's areas. They did not come to any definite conclusion, but only gave general advice. Those members who, instead of selling coke, were able to stock it, would to-day reap a great advantage. The Commercial Section was a Midlands Section; and the idea was sooner or later to be affiliated with all the other Commercial Sections throughout the country, and by this means to be able to place before the members current prices of different things they had to buy and those they had to sell. The Commercial Section was not formed with the view of making a "ring," or keeping up artificial prices, but to bring to the notice of members current prices and the market prices of goods they had to sell. He was quite certain that if they, as members, were true to one another, and helped one another as far as possible, the Commercial Section could do nothing but good. It would bring them to know one another; and in this way to do better for their respective undertakings. As to the revision of the rules, he remarked that they had been before the members, and were as simple and elastic as possible. It had come to his knowledge that some members had said that the Commercial Section was not quite fulfilling their expectations; but he (Mr. Bell) would remark that the Association was what the members made it. All members of the Midland Association were eligible for membership of the Commercial Section; and if, instead of complaining, they would join the section and do their best for it, it would be a good thing not only for the industry at large but for themselves. Their attitude ought to be—not "what good shall I get from the section?" but "by joining the section, can I help the gas industry?" Every member, by joining the section, could do something to benefit the gas industry.

Mr. P. G. Winstanley (Wolverhampton) seconded the motion; remarking that anybody reading the report would agree that it formed a striking record as to the energy and capacity of the President and Committee.

Mr. G. Helps (Nuneaton) said that hitherto he had looked upon the Commercial Section as something for the "big fish;" and he had thought that the big fish were going to swallow the small ones. Being a small fish he had not joined the section. But he did think that when men set out to tackle difficulties in the manner those responsible for the conduct of the Commercial Section had done, he (Mr. Helps) and others might follow them, even if only for a short time, and see what good could be derived. The subscription was certainly small—only a matter of half-a-guinea. He intended to join; and he hoped that some of the other members who had held back would follow his example.

The motion was agreed to.

District Representative on the Institution Council.

Mr. C. H. Webb (Stourbridge) proposed that the President should be the Association's representative on the Council of the Institution of Gas Engineers. The matter had, he said, been considered by the Committee, who made the recommendation that Mr. Baker should be asked to serve.

Mr. W. S. Morland (Gloucester) seconded the motion; and it was carried.

Acknowledging his appointment, the President thanked the members for their renewed confidence, and promised to do his best in the interests of the members at the Council meetings in London. Personally, he felt that, at a time like the present, he could do nothing else than continue in office for a second year, although just now they had all got plenty in their respective towns to keep them occupied. He apologized for having no presidential address that day. He had quite intended to prepare one; but owing to the work involved in the re-organizing and the building of a new works at Mansfield—besides arranging for the building of hutments for 20,000 soldiers in their area, to say nothing of water-works extensions and a short staff—he had had to drop the idea of a presidential address. He hoped in the near future to give some short account of his experiences in the building of the 20,000 hutments, and also in regard to the new works that would be installed.

"Association Reports" for the Members.

The President, alluding to the matter of providing copies of reports of transactions of District Associations, mentioned that the point had been considered by the Committee, and the conclusion had been reached that the reports should only be sent to

those members who had paid their subscriptions. He proposed a resolution in this sense.

Mr. BELL seconded the motion, and it was approved.

NEW MEMBER.

On the proposition of Mr. W. C. JONES (Brierley Hill), seconded by the SECRETARY, Mr. C. H. Carder, of Oldbury, was elected a member.

PAPERS READ.

Mr. GEORGE STEVENSON (Long Eaton) read a paper entitled "Illegal Competition." It will be found below.

The PRESIDENT, in introducing Mr. Stevenson, said he had half promised to prepare another paper on a subject which for the present he would keep dark. He (Mr. Baker) very much appreciated the way in which the papers had come forward. Had it not been for the crisis, there would have been a fine crop of papers that day.

Mr. E. STROUD subsequently read a paper—entitled "Some Notes on Illumination"—of which he was joint author with Mr. V. H. Mackinney. It will be found on page 661, together with a report of the remarks by members to which it gave rise.

VOTES OF THANKS.

Mr. BELL proposed a vote of thanks to the readers of both papers. Regarding the last, he said he was very glad to know that the Holophane Company were devoting more attention to gas lighting. Gas engineers must not be satisfied just to supply gas, but must take consumers into their confidence, and show them how true scientific lighting could be effected. From his own personal experience, he knew that Holophane globes were a great advantage. In his own dining-room he wanted artistic and effective lighting, and tried many different kinds of globes. At last he decided upon Holophane globes, and he was perfectly satisfied. In regard to the question of cost, he was afraid that in the past gas engineers had gone in more for cheapness, both in fittings and globes. If they, as managers, pointed out to consumers that what they were giving them was something efficient and artistic, and that it would save them money, he thought they would go to the extra cost. He quite believed that when the papers they had heard were printed in the technical journals they would be read with great interest throughout the gas industry.

Mr. MORLAND seconded the proposition, observing that both papers would be very serviceable.

The motion was cordially endorsed by the meeting.

Mr. STEVENSON and Mr. STROUD briefly replied.

The PRESIDENT, just as the members were separating, referred with regret to the fact that Mr. Cooper, an early member (if not one of the founders) of the Association, had had the misfortune, soon after Christmas, to lose his wife; and Mr. Ely, of Pye Bridge, had also lost his wife. He asked the Secretary to write to both gentlemen conveying the deep sympathy of the meeting with them in their sad loss.

The members approved the suggestion by up-standing.

The meeting then closed.

ILLEGAL COMPETITION.

By GEORGE STEVENSON, of Long Eaton.

[A Paper read before the Midland Association of Gas Engineers and Managers, March 11.]

At the request of our President, the author has pleasure in submitting notes of his Company's recent experience in litigation on the question of preferential trading in electricity. He is conscious that these notes are of an unusual nature, and will probably be considered "dry" in comparison with those of a strictly technical kind. Yet, in his opinion, the points at issue were equally as important and far-reaching to the gas industry. For no new system of manufacture or distribution—however good it may prove to be—nor any method of reducing the cost of the finished article, is of much advantage unless there is an order to "deliver the goods."

At the outset, the author would say that he does not attack municipal trading *per se;* for there is much to be said for and against this particular form of public service. But gas companies operating against municipally owned electricity undertakings are hardened to injustice and damage of many kinds.

It is the common experience to find the present and prospective use of gas entirely prohibited for street-lighting and other public uses, quite irrespective of either efficiency or economy, simply because the electricity undertaking belongs to "the people." This unfair excuse is also carried to the length of specifying that no gas-lamps shall be erected on new estates on pain of not being "approved by the authorities;" and it is the reason also that gas companies are often debarred from even tendering for public service where municipal electricity can be used.

In view of these facts, the author is constrained to paraphraze the famous saying of Madame Roland: "Oh, Liberty, what crimes are committed in thy name!" He would say, however, that he has no feeling of animosity towards "our friend the enemy." In his opinion, there is room in most towns for both gas and electricity undertakings to live and prosper; and the prosperity of the citizens is often as vital to the one as to the other.

There is bound to be constant and keen competition for business; and so long as this competition is healthy, and within the limits of the law, the public have everything to gain, while the supply undertakings may be safely trusted to look after themselves.

Railways, gas, water, electricity, and other public service undertakings are rightly subjected to Special Acts, which direct their conduct, and limit their powers. Indeed, it may be said that if Parliament is ever justified in interfering with Free Trade, it is justified in the regulation of undertakings which require parliamentary sanction for their construction.

In all the above Acts, the interests of the public are carefully safeguarded, and particularly so in the provision clearly made for the prevention of preferential treatment. The principle clearly laid down is that the public shall be charged the same price for the same service, if the circumstances of the supply are similar, and that no undue preference shall be given. The clauses interesting to us are those relating to gas and electricity, and these are well known. They are the discount clauses in Gas Acts and sections 19 and 20 of the Electric Lighting Act, 1882.

An ordinary commercial business, not subject to statutory control, is under no obligation as regards prices, and preferential treatment is quite common, and is quite legal at common law, though often enough its object is the destruction of undesirable competition.

Although details have been published in our Technical Press, it may be of advantage in the first place to relate the conditions which led to the recent litigation, and afterwards to suggest the significance of the general application of the verdict.

In Long Eaton, gas is supplied by a Company and electricity by the District Council. There are many "shed" factories, the number of which has rapidly increased; and the motive power is nearly always gas or electricity. Special prices for power purposes exist for both supplies. Some manufacturers also use gas for lighting and electricity for power; some *vice versâ;* some both services—gas and electricity. Up to the time of this dispute, the rates applicable to the respective supplies were charged, regardless of whether both light and power were given to the same service. Owing, however, to the efficiency of high-pressure gas for lighting, combined with a special fitting supplied by my Company, several manufacturers who used electricity both for lighting and power, discarded electricity for lighting, still retaining electric power. The Council thereupon issued a notice, the effect of which was that, although special rates were in force for power, these rates would not apply *unless electric light also was used.* That was to say "give us all your business, or we will charge you extra (or boycott you) for that which you do give us." In other words, "we will give you preference if you use all our energy and use no gas." This was the thin end of the wedge; and it is easy to imagine to what lengths the logical extension of this practice might lead. There would be, in fact, no limit to the harm that could be done to gas undertakings.

My Company lost many consumers; and eventually they decided to test the applicability of sections 19 and 20 of the Electric Lighting Act, 1882.

The allegations of preferential charges were not denied; in fact, it was admitted that the Council had actually refunded excess charges *when* (and *only* when) they had succeeded in getting their customer to take out all his gas. The defence submitted was generally under three heads:

1. *Load Factor.*—It was said, and said truthfully, that electricity supply differs fundamentally from gas supply in the fact that a constant demand is of more commercial value to the former who have not the same advantage as gas companies in the matter of storage, and that a favourable load factor greatly influences costs and selling prices. But we had no difficulty in completely answering this defence, inasmuch as the load factor of electricity consumers who used gas also was in many cases a higher one than that of consumers who used electricity solely.

2. *Diversity of Load.*—Having failed on the first line of defence, our opponents made a great effort to justify their preferential charges on the ground that the diversity load factor of their supply was greatly improved in the special circumstances of Long Eaton, by reason of the fact that consumers who used light as well as power would probably use light when the load for power had become easier; and that therefore the light used in these circumstances cost them less by reason of the utilization of surplus generating plant, and so the manufacturer who gave his custom for both supplies was a more profitable customer and was entitled to a preference. Diagrams and curves of loads were submitted, and were fully criticized and examined. The fatal part of all this ingenious and highly technical defence was the fact that the supply undertaking were obliged to put down plant for dealing with the maximum demand for both light and power at one and the same time. This was proved by their own curves; and, therefore, this suggested justification fell to the ground.

3. *General Practice.*—The third, and perhaps most truthful, if not legal, point of defence was that the practice of giving these preferential prices was "well-established and was general all over the country, by reason of the competition of gas undertakings." Indeed, it was seriously argued that if the practices complained of were declared to be illegal, the business of electricity supply could not be carried on—a piece of rhetoric as extravagant as it was ineffective.

After a most careful hearing—during which the importance of the case to both competing industries was commented upon—a considered judgment was given in our favour, and (when challenged) was confirmed by the Court of Appeal.

The author believes this is the first time since the Electric Lighting Acts were passed that a competing gas company has asked for a judicial settlement of disputed points of administration. The net result may be summarized briefly.

1. In the case under discussion—supplies being separately metered and separately charged—the supply of electric power is a separate supply; and if the circumstances are similar, the price must be the same, apart altogether from the supply of light, "an altogether extraneous factor in this case."

2. The general language of the law relating to the supply of electricity (and presumably also of gas) being similar to that of the Railway and Canal Traffic Acts, the present case was governed by the clear distinction to be found in the decisions on those sections between legitimate and illegitimate reasons for making a lower or preferential charge under legislation of this kind; and the governing distinction was defined as follows: A must not be charged less than B, merely to overcome a greater reluctance on the part of A to become a customer, or to induce A to become a customer in respect of another supply, *although either of these reasons might be a good commercial reason for charging less to A, were the public undertakers merely carrying on any ordinary commercial business.* On the other hand, any circumstances which render it less costly (or otherwise more profitable) to supply A than B, constitute a legitimate reason for making a lower charge to A for the same supply. And if the Court once came to the conclusion that some such circumstances existed, then proof would not be required that the diminution in the charge was precisely equivalent to the diminution in the cost of the supply.

3. The new scale of charges for electricity had no commercial justification; the object being to "oust the gas company."

The Council have now withdrawn and revised their charges. But even so the gas company ought to have a right to damages for custom they have illegally lost; and also consumers who have been wrongfully charged should have a just claim for re-imbursement. These matters are now receiving attention.

Applying the broad lines of this now accepted judgment, it is not difficult to find many instances where our competitors have deliberately framed "tariffs" (fearful and wonderful to contemplate) with the object of ousting the gas supply. In many towns they are thus acting illegally, and—what is our chief and only concern—the gas undertaking is suffering. When new business is being negotiated, many of us have been left out by reason of our competitors giving certain preferential rates—"special terms," as they are called.

These are only justifiable, so long as the general public is supplied at the same price in similar circumstances, or on proof (the onus being on the undertakers) that the supply is "less costly or more profitable." But often the rates are not disclosed. One could multiply instances which to say the least are suspicious; and it behoves all gas undertakings to be on the alert to take full advantage of the present position of the law on these matters—not necessarily in any spirit of hostility, but in the interests of honesty and fair play.

In the case under discussion, it was proved that, in order to drive out the gas supply for lighting, the Council were supplying electric light for less than nothing. Since the judgment was confirmed on appeal many electricity undertakings have seen the error of their ways; have mended their manners; and are now doing business on businesslike lines, and within the limits Parliament intended and directed that statutory undertakings should observe, and which, be it noted, are not necessarily the same as those of an "ordinary commercial business."

The author has received scores of letters from gas undertakings in Great Britain and Britain beyond the seas all alike complaining of unfair competition. He has been unable to answer all these communications, but would now take the opportunity of stating that the small victory in which he was somewhat interested does not decide the validity or otherwise of all the alleged malpractices complained of. It does not "shut up" electricity concerns, neither does it help gas undertakings who will not help themselves. Where illegalities are thought to exist, the only way of redress lies in the careful study of local circumstances, and if these are favourable, the gas company should immediately communicate with the Attorney-General, whose duty it is to enforce the observance of statutory obligations.

Incidentally, it may be mentioned that a number of municipal gas engineers have derived distinct benefit from the new state of things, and even so where the competing authority is under their corporation's control.

In conclusion, the author desires to gratefully acknowledge the valuable help afforded to him by Mr. Thomas Berridge, J.P., a Past President of this Association (without whose powerful aid "in high quarters" this matter might never have been brought to a conclusion), and by our own Technical Papers. He would also acknowledge the fair tone of the more sober Electrical Journals, which to their credit have taken a broad and very fair view of the whole proceedings.

DISCUSSION.

Mr. J. Ferguson Bell (Derby), in opening the discussion, said he should like, first of all, on his own behalf and on behalf of the gas industry generally, to thank the Directors of the Long Eaton Gas Company, and their Engineer, Mr. Stevenson, for bringing the matter of illegal competition before the Courts. It was a very important matter, and one which had troubled many gas companies. Personally, he (Mr. Bell) had no doubt most of them were extremely pleased when they knew that at last the principle involved was to be taken to the Court of Appeal, to have a considered judgment upon what was legal and what was not legal. The only point on which he thought he would venture to differ from Mr. Stevenson, in his paper, was where he said that municipal trading in certain cases might be desirable. Personally, he (Mr. Bell) was altogether against municipal trading in any shape or form. He knew there were many present who represented municipal corporations; and he wanted it to be understood that he was not speaking either against the corporations or the gentlemen who represented them, but against the system. He believed this country would yet rue the day when they allowed municipalities to embark on trade. Municipalities were created in the first place to do certain things for the advantage of the public health, libraries, baths, sanitation, and other important things which, as public-utility societies, they could do for the benefit of the community much better and more cheaply than anyone else. But when corporations went into industrial undertakings they left the province in which they were first constituted to work, and it was not for the benefit of the community at large that they had been allowed to do so. There was no doubt that in years gone by ratepayers in most towns were fairly gullible, and were told what enormous profits could be obtained if corporations were only allowed to enter into private-utility service. Profits had been obtained; but if they would look at the returns issued by the late Borough Accountant of Preston (Mr. Carter), they would be rather surprised to find that the corporations which did the least municipal trading were the places where the rates were the lowest. This did not say much for municipal trading. He (Mr. Bell) was inclined to think that the profits shown were in many cases mere paper profits. When he heard that Mr. Stevenson was going to read his paper, he thought he would like to look up Long Eaton in Mr. Carter's tables; and perhaps Mr. Stevenson would tell them what the rates were there. He found that at Long Eaton the capital of the electric light undertaking was £35,195; and he immediately looked to see what they were paying in rates. The figure was only £187 10s. He then looked at the Gas Company's accounts; and he found that they had a capital of approximately £110,000, and were paying over £1300 a year in rates. From these figures it was certainly manifest that the electric light undertaking, instead of paying £187 in rates, ought to be paying something like £450. Wherever there were these municipal undertakings, they were not rated properly. The electric undertakings which belonged to companies were generally much higher rated than in the case of municipal undertakings. If this were so—if corporations liked engaging in trading, and they were not rated according to what they should be for their capital—they could easily make "profits;" but they were making them at the expense of what they ought to be paying in rates. In other words, Long Eaton, according to his idea, was doing the rates out of £300 or £400 a year. With regard to Mr. Stevenson's point about preferential charges, authorized gas companies were clearly prohibited from making such charges, and they had never given preferential rates. But when the electricity department came into operation they wanted to get business on any terms, and the question often was—at any rate, it was in his town—not whether they could make a profit, but "How much are you paying for gas, and we will quote you such a price as will come below it." This practice had now been declared by the Court of Appeal to be illegal. What they as a gas industry desired was simply fair and honest trading as between gas and electric undertakings. He did not advocate any restrictions being placed upon electricity; he did not complain of any fair and reasonable competition; but he did say that electrical undertakings had no right to supply an article at very considerably less than it cost to produce, which was what had been done in a great number of instances all through the country. He hoped that the decision which the Long Eaton Gas Company had recently obtained, and Mr. Stevenson's paper, would bring the matter more prominently before the gas industry; and that they as gas undertakings would see that corporations and other local authorities did not continue this illegal trading. Legal proceedings had been carried first to one Court and then to the Court of Appeal, where the Lord Chief Justice made short work of the Local Authority—pointing out very clearly that there was no power to give preferential rates. Why an electric undertaking should desire preference to boycott gas, passed his (Mr. Bell's) comprehension. He did not know what electrical undertakings would have said in the early days of electricity (when people installed electric light) if gas companies had gone to them and stated: "If you have electric light your gas charges will be so much more or we shall have to cut you off." What they said to them was: "You can have gas or electricity, but our rate for lighting is a certain price, and for power is another price." And these rates were all they asked. But the electric light undertakings first of all had their maximum demand rates; then special rates for power and for lighting; then if a customer did not use gas at all he had another rate; while now they charged so much per week and as much current could be used as a customer liked. He believed it would be a good thing, even for the electrical industry itself, if it were obliged to obey the law and use ordinary business commercial terms in the same way as any other industry. Mr. Stevenson very properly pointed out that an electric undertaking was in the same position as a gas undertaking. It was a statutory concern with certain privileges conferred by Act of Parliament. In return, it was incumbent upon it, as having a monopoly for a certain article, to

supply all customers alike; and he hoped they would see that all electric undertakings did obey the law. He was very pleased indeed that Mr. Stevenson had brought the paper before them, and that his Company, which was not a very large one, had had the courage to tackle the District Council. Mr. Stevenson had done a great work for the gas industry. All they asked was that electric undertakings should obey the Act of Parliament. If they did so, the gas industry was perfectly satisfied.

Mr. H. E. Copp (Etruria) remarked that the subject before the meeting was one of considerable interest to him. He regarded the paper as one of the most valuable to which they had listened for a long time; and Mr. Stevenson had placed the gas industry under a debt of gratitude to him and his Company for what they had done. Mr. Stevenson had put his case in an exceedingly fair and unprejudiced, and at the same time most convincing, manner. As to the multiplicity of charges for electricity, he (Mr. Copp) had come across some fearful and wonderful things in his time. He thought the electric people were too much led away by the question of load-factor. He knew of a case of a large undertaking in the Midlands which only the previous week deliberately decided to sell at ¼d. less per unit than their published returns showed that they were capable of producing at, and they had made a contract to do so. It was an extraordinary thing that a body of men in charge of a public service could do such an absurd thing, because it was bound to come back upon them in time. Of course, it was very difficult to get to know just what the costs of generation were. Any gas manager who was in competition with electricity should have the figure very clearly before him; for without it he could not talk to consumers. A short time ago he (Mr. Copp) set down a series of bases on which to calculate the cost of lighting and also power for electricity and gas. He showed how certain efficiencies could be obtained from electricity by using certain lamps utilized in a certain manner. He gave the efficiency of all the common lamps on the market, and also the figures of gas lighting. He had printed details, and was consequently able to challenge any one to disprove them. He thought they would be very useful in time, because they were figures which he was quite prepared to back before any authority. He might tell the members that the steps he took in this way had very materially altered the attitude of the local authority. He had very much enjoyed Mr. Stevenson's paper, and was very pleased the matter had been brought forward.

Mr. C. H. Webb (Stourbridge) agreed that the paper was one of the most interesting that they had heard for a long time. Mr. Stevenson had said that gas companies operating against municipally owned electricity undertakings were hardened to injustice and damage of many kinds. He (Mr. Webb) should like to say that gas undertakings owned municipally were often hardened to injustice and damage by electricity concerns. He was a municipal gas engineer; and in his district they had to meet one of the keenest electricity concerns that he thought there was anywhere in the country. This company had all sorts of charges. The ordinary consumers paid for light only about 3½d. per unit, shopkeepers paid 2½d. per unit; publichouses 2d. per unit; and for power there were all sorts of prices—down to ⅜d. and ½d. per unit. Then as regarded similarity of conditions of supply, a consumer could receive from the electric company the same number of units in a quarter, but (say) he used them between 6 a.m. and 6 p.m. one set of conditions applied; if he used them between 6 a.m. and 5 p.m. there was an entirely different set. If, too, they used the current on Sunday, they got a special price. He could understand some of these distinctions, but others were simply unintelligible. He knew that if a consumer was getting electricity at ¾d. per unit, and he threatened to instal a gas-engine, the price was at once put down to ⅜d. per unit. The company must at all risks try to retain the business. He thought too much was made of the point about power-load and lighting-load. In the case of gas undertakings, they certainly did have a big advantage in storage; but even taking this into consideration, it must be remembered that in certain months of the year the day or power load overlapped the lighting load. He was referring to between 3 p.m. and 6 p.m. from November to January; and although they might counteract this by increasing pressure, and although their holders might help them through this period, the time would come when they would have to put down additional mains for these two loads. It was not fair to neglect the main proposition in working out the advantage of a power load to the undertaking. He had not himself come across the argument that the supply was less costly or more profitable as applied to a gas undertaking. The conditions that they had to work upon were that they could fix the rate for any supply, or any condition of supply, on the understanding that in every case the consumer who had similar requirements would come along and demand exactly the same treatment. It was quite feasible that two men who wanted (say) a million cubic feet of gas per quarter for power might be in different positions so far as the works were concerned. One might be near the works, and the gas undertaking would be very glad to have him, because he was on a large trunk main; another man might be at the far end of the district on a small main. But he did not think they could say that, because a man was near the works on a trunk main, he should be supplied any cheaper on this account, because they might have to put down a larger main to supply the man at the far end of the district who was now on a main that was overworked.

Mr. Stevenson, replying to the discussion, first dealt with Mr. Bell's observations on the subject of municipal trading. He said that Mr. Bell was a prominent member of the Derby Town Council, and was dead-against municipal trading in any form. He had been consistent in this, and he (Mr. Stevenson) vividly remembered his election propaganda. While he (the speaker) was not going to the length of Mr. Bell, yet he was bound to say that, young as he was, the more he saw of municipal trading the less he admired it, because after all said and done the service of gas or water or electricity was so hedged-about by parliamentary restrictions that as a rule the service was better given by a company than by a corporation. They must never lose sight of the fact that to a very large extent the "carpet bagger" ruled many features of a corporate undertaking. It was generally a party or political clique of some sort which ran these undertakings—not always necessarily in the interests of the town—first and often in the interests of their own clique or party. This was very undesirable; and they saw some of it in the gas profession. Though he could not entirely agree with Mr. Bell, he had great sympathy with him. Mr. Bell had referred to the admirable tables published by Mr. Carter, of Preston. In Long Eaton, the electricity concern make almost half as much profit as the gas undertaking made; and yet it was assessed to the rates at £187. This was most unfair; and the same remark applied very much all over the country. When an electricity or water department belonged to a municipality it was often very much under-assessed. Mr. Bell had rightly observed that gas companies and electricity companies were prohibited from making preferential rates. He (Mr. Stevenson) was not a Pharisee, but he thought they might quite safely say that as gas undertakings they had not a lot of different rates. They had one rate for lighting, one for power, and one for industrial purposes; and though these rates might vary—decreasing in price as the quantity used increased—yet they agreed and accepted the principle that under the same circumstances everybody was entitled to the same supply at the same rate. Electricity people did nothing of the sort. It should always be remembered that everyone in a town had the right to be supplied on the same terms. But the rate might not be disclosed, and therein came the evil. It was abundantly clear from the attitude taken up by the Lords Justices in the Appeal Court that they viewed with very grave suspicion any such questionable justification as the load-factor or diversity of load, because they thought they saw that the public who had no access to the details might very well be served in a wrongful way. As the Lord Chief Justices said, they must treat everybody alike, and then there would be no trouble. Henceforth all these things would be illegal. Many of the maximum demand systems would be illegal, and the Norwich system would be illegal. It had always puzzled him how electricity could be sold at one-half the cost of production. To say that the load-factor accounted for all the difference was stretching things too far. Mr. Copp had contended that gas companies must in future know more about their competitors' costs. He (Mr. Stevenson) agreed; for if all of them had not to meet the same competition to-day they would have to to-morrow. Special prices were not prohibited at all; but if they were given, and were challenged, then the suppliers had to be prepared to prove that it was either less costly or that it was more profitable. This was the criterion that had upset the whole electrical world. There was plenty of room for both gas and electric undertakings; and if the electrical undertakings had been doing wrong, they could easily reform by coming within the limits of the law.

SOME NOTES ON ILLUMINATION.

By V. H. Mackinney and E. Stroud.

[A Paper read before the Midland Association of Gas Engineers and Managers, March 11.]

Introduction.

This paper is primarily written to emphasize the extreme importance of a special study being made with artificial illuminants, so as to obtain proper and predetermined distribution of light. If one examines the buildings of to-day, one finds that their shape is settled very largely by the necessity to provide ample daylight. In the cotton factories of the North, extraordinary pains are taken to secure maximum window space, and the schools of to-day are designed specially with a view to the proper natural lighting of the desks.

It is somewhat singular—seeing that such care is devoted to the natural lighting of buildings—that the provision of artificial light does not receive more care. Not infrequently when buildings are erected, the artificial lighting is left to the very last, and the amount expended on it is quite out of proportion to its importance. Yet in the present age, artificial light plays a significant part. The great developments in illuminants during the last century have revolutionized the traffic conditions in our streets, enabling swift moving vehicles to pass where once men moved with a sense of danger. Also much of the labour of to-day is done by artificial light.

Good Illumination and the Care of Health.

It is therefore a matter of importance that the artificial light, which we now use so freely, should be properly arranged. Bad lighting affects the health in many ways. Not only does the general health of people habitually working amid gloomy conditions suffer, but the mere fact of their trying to work under these

difficulties imposes a strain. Many years ago, the conditions of eyesight in the schools had already given grave concern to the medical authorities. Classes were formed where as many as 20 or even 30 per cent. of the children suffered from defective vision; and much of this was believed to be due to strain imposed on the eyes by working in unsatisfactory illumination. During recent years, educational authorities have been making special efforts to better the lighting of schools. In 1913, a Joint Committee, promoted by the Illuminating Engineering Society, issued a report on the subject, and experiments are constantly going on with a view to making further improvements.

Good lighting is naturally of special consequence to the young; but the adult worker in the factory also suffers if the light is bad. Anyone who has been through a cotton mill, and seen the complicated machines at work, will realize the strain caused by tending them under insufficient light. But bad lighting, by adding to the strain of labour, causes fatigue and general deterioration in health, even when it does not directly affect the eyes. So well is this realized that the Home Office in this country has appointed a Departmental Committee to study the subject, and exhaustive inquiries into the illumination of many kinds of factories are now being made.

Good Illumination as a Safeguard against Accidents.

There is another way in which bad lighting affects health and causes loss. It is now well established that it is directly responsible for a large number of accidents. Investigations have lately shown that the greatest number of mishaps occur in the winter months, when artificial light is mainly used. It has been shown, further, that accidents and spoiled work occur chiefly in the twilight hours, when daylight has faded and has been replaced by artificial light. Statistics show, too, that certain trades are more affected than others. In the case of mechanical and engineering workshops and shipyards, nearly 75 per cent. of the accidents have been found to occur during the dark hours. All this shows that there are defects in artificial lighting which lead to mishaps, and which therefore are remediable. Then there is also an indirect cause of accidents to be found in the fact that badly lighted machinery soon gets neglected because it cannot be seen; the dirt paves the way for an ultimate breakdown, possibly with serious consequences.

It has been proved that unsatisfactory lighting is often a cause for spoiled work, and that it slows-down the speed of operators and limits the output. In a certain factory tests were recently made before and after an improvement in the lighting, and it was found that the output had been increased by 11 per cent. Now the cost of lighting is always a minute fraction of the wages bill (in many industries less than 1 per cent.); so that even a small increase in output would more than repay the relatively small cost of putting the lighting on a satisfactory basis.

Naturally, much of what has been said above applies equally to office lighting. A badly lighted office is never well kept. Things get out of place, mistakes are made, and much time is wasted. In many other cases, we find the same thing. A badly lighted shop fails to attract custom, and is a constant source of annoyance both to the staff and the customer.

Shop window lighting has become a fine art, and up-to-date merchants fully recognize the value of well-lighted windows as an advertisement. Not long ago, some experiments on this point were carried out in a well-known store. The number of people passing who looked into a certain indifferently lighted window was noted. It was found that the window attracted the notice of about 12 per cent. of the passers-by. Then the services of an expert were called in, and the illumination was redesigned in a thoroughly up-to-date decorative manner. Account showed that no less than 72 per cent. of passers by now looked in.

What Constitutes "Good Lighting."

From what has been said above, the value of good lighting should be evident. But it is not such an easy matter to say exactly in what good lighting consists. There are, it is true, certain fundamental requirements that must be met.

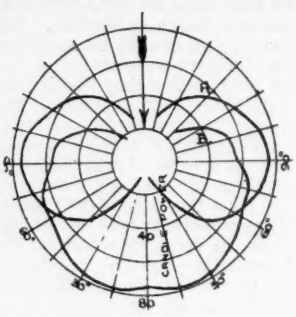
The light should be sufficient. In an office or workshop, for example, we must provide enough light on the work to enable the workman to do his task in comfort, or the clerk to read and write with perfect ease. We must also provide sufficient general illumination in the room for all surrounding details to be clearly visible. The illumination should be just right. Too little would be a hindrance to the worker, and therefore uneconomical; too much would be waste.

Another fundamental rule is that the light should be directed where it is needed. This implies two things: That the lights are arranged in the correct positions, and that the lamps are provided with the correct shades or reflectors screening the light from the eyes of the workers and directing the rays where they are required. Proper shading, in fact, is one of the first requisites in successful illumination. It is not enough to provide a bright light. An unshaded source throwing the light right into the eyes of the worker, instead of on the work that he is doing, is a constant source of annoyance.

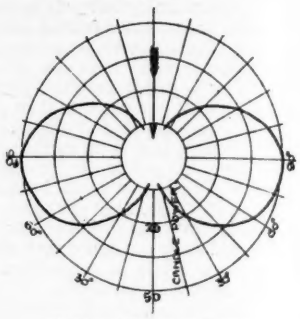
There are, of course, many special points to be considered in artistic lighting. The light should come from the right direction, the shadows should be just right (neither too soft nor too hard), the glassware used with the lamps should be suited to the surrounding. But all these requirements can be met by the trained illuminating engineer.

Light Distribution.

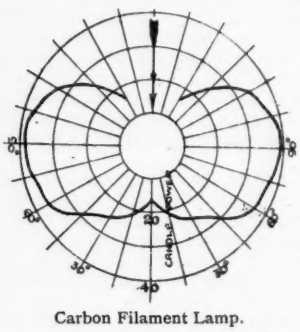
To carry out any lighting problem in other than a haphazard manner, one must have full particulars as to the polar distribution of the light-source in question, and also the actual candle power emitted by the source in the different zones. This brings us to the question of the rating of lamps. Most lamps at the present time are rated by their horizontal candle power, which candle power is usually the maximum. This rating would possibly meet the case, providing the various sources all gave the same distribution of light. The lamps available at the present time admittedly differ enormously one with another in this respect. Note, for example, the contrast in the light immediately below an upright and an inverted gas-burner, and the difference in the distribution from carbon, ordinary tungsten, and half-watt lamps—see figs. 1, 2, 3, and 4.



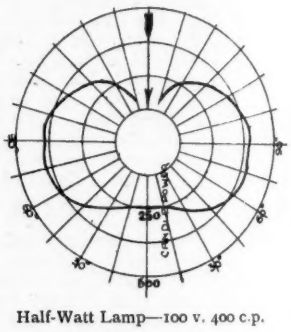
A. Upright Gas-Burner.
B. Inverted Burner.



Ordinary Tungsten Lamp.



Carbon Filament Lamp.



Half-Watt Lamp—100 v. 400 c.p.

Figs. 1, 2, 3, 4.

From these curves it will be noticed that in the case of the upright gas-burner, carbon, and ordinary tungsten lamps they give the maximum candle power in the horizontal direction, with a great diminution in the vertical, due to the construction of the burner or the formation of the filament; while in the case of the inverted gas-burner and the half-watt lamp, the candle power is approximately the same over the whole lower hemisphere.

The horizontal candle power measurement was adopted simply because it was the customary and most convenient method of measuring the light intensity of gas, oil, and candle flames which burn generally in a vertical direction. As horizontal measurement of candle power disregards all light save that emitted in a horizontal direction, and as light sources giving widely different total amounts of light may emit the same amount of light in a horizontal direction, it obviously follows that this method of candle power measurement is incomplete, especially when lamps of different types are compared.

A full and complete measure of candle power requires consideration of the light given out in all directions, or at all points of a sphere surrounding the lamp. If we take the mean of all these candle power values, we have what is termed the mean spherical candle power. The mean spherical candle power may then be considered as a measure of the total flux of light:

$$\text{M.S.C.P.} \times 4\pi = \text{total lumens emitted}$$

and thus be directly comparable one source with another. In any case, it is rare that the source gives exactly the distribution of light required for a specific problem, and it is almost always necessary to use with it a suitable reflector.

Functions of Shades and Reflectors.

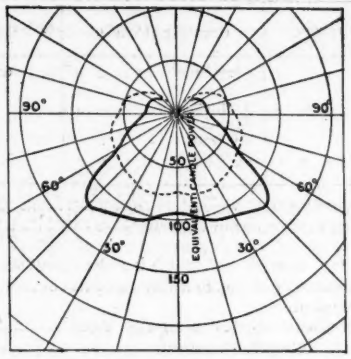
The main functions of shades and reflectors might perhaps be defined as follows:

1.—The screening of the source of light from the eye and avoidance of glare.
2.—The direction of light where it is chiefly needed (*e.g.*, reduced illumination of the upper parts of the walls and ceiling and improved illumination on the working plane.
3.—The softening and toning-down of shadows.
4.—Decorative effect.

Of these, the economical advantage of altering the distribution of light from a source so as to suit one's convenience is manifest.

The following polar curves show how the bare lamp distribu-

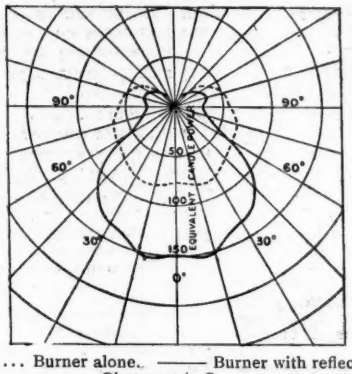
tion can be altered, and how great are the advantages to be derived by using a suitable reflector—see figs. 5, 6, 7, 8.



..... Burner alone. ——— Burner with reflector.
Photometric Curve.

Fig. 5.

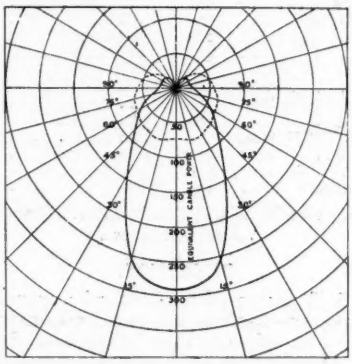
Fig. 5 shows the distribution obtained by the extensive type "Holophane" prismatic reflector, which gives a maximum illumination over a 45° zone from the vertical, the maximum being 1½ times the rated candle power of the burner.



..... Burner alone. ——— Burner with reflector.
Photometric Curve,

Fig. 6.

Fig. 6 shows the distribution obtained by the intensive type "Holophane" prismatic reflector, which gives a maximum illumination over a 30° zone, which maximum is twice the rated candle power of the burner.



..... Burner alone. ——— Burner with reflector.
Photometric Curve.

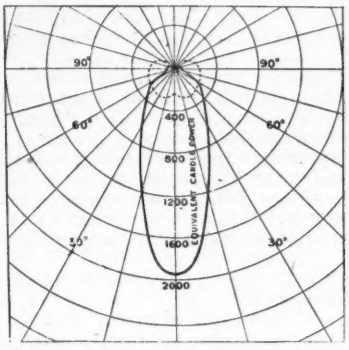
Fig. 7.

Fig. 7 shows the distribution obtained by the focussing type "Holophane" prismatic reflector, which gives a maximum illumination over a 15° zone, which maximum is 3½ times the rated candle power of the burner.

Fig. 8 shows a still more focussing type of "Holophane" reflector, which gives a maximum over a 7° zone of 6½ times the rated candle power of the burner.

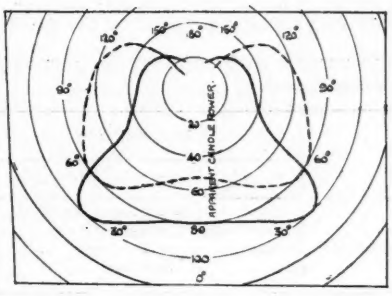
This range shows the complete control of the light which it is possible to obtain with properly designed prismatic reflectors, and also, from the practical point of view, the flexibility of the system in adapting existing installations with any of the types available to obtain the maximum working efficiency of the light sources.

Fig. 9 shows the distribution obtained from a bowl type white glass shade which is of a general nature; and fig. 10 shows the distribution obtained from a conical-fluted mirror reflector which gives a very concentrating curve. The whole set of curves of open type shades and reflectors shows rather an interesting set of conditions: With white glass one can only obtain a general distribution; with mirrored reflectors only concentrated distribution; and with prismatic reflectors properly designed, any distribution from extremely concentrating to extensive can be obtained. With enclosing glassware one has a very similar set of conditions.



..... Burner alone. ——— Burner with reflector.
Photometric Curve.

Fig. 8.



..... Lamp alone. ——— Lamp with reflector.

Fig. 9.

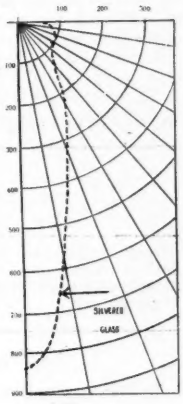


Fig. 10.

A frosted globe, which only has diffracting properties, leaves the distribution curve of the illuminant essentially unchanged, and merely smooths it out by averaging the light flux over a narrow range of angles.

An opal or white glass globe, which is an excellent diffuser, entirely changes the distribution curve by substituting the diffusing globe as a secondary radiator, and retains only for a small portion of the light the original distribution.

A mantle in an opal globe (not too dense) is, therefore, clearly but faintly visible surrounded by a brightly luminous globe. In the case of the frosted globe the mantle appears as a bright ball of light, while its outline is not visible—the globe being non-luminous or but faintly luminous.

With prismatic globes it is possible to obtain both good diffusion and redirection of the light rays; and being clear glass, and consequently low absorption value for the resultant globe, gives this class of material a distinctive position over other types. Clear glass with correctly designed prisms affords a means of controlling light to the greatest extent and redirecting it more efficiently than any other known material. This fact cannot be refuted.

The following diagrams (fig. 11), showing diffraction, diffusion, and total reflection, may help to make the points more clear.

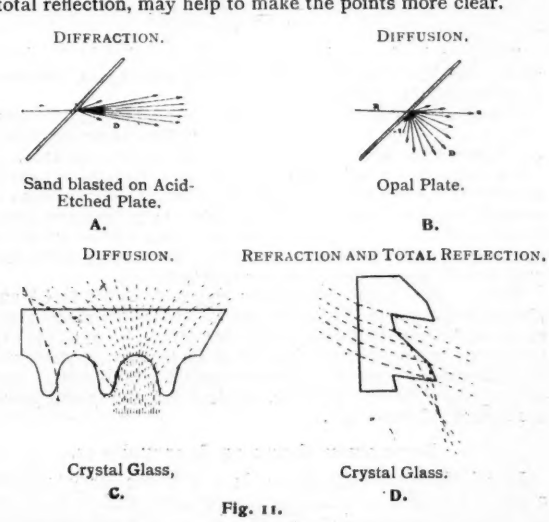


Fig. 11.

Diffraction (A).—The beam of light R issuing from the source is, in traversing the diffracting plate, scattered over an angle—that

is, issues as a bundle of rays D of approximate equal intensity in the middle and fading at the edges. The direction of the scattered beams of light D—that is, its centre line—is the same as the direction of the impinging beam R, irrespective of the angle made by the diffracting sheet with the direction of the beam.

Diffusion (B). The main beam of light R passes through the opal plate (as A) without scattering or change of direction, but with very greatly reduced intensity; usually also with a change of colour to dull red, due to the greater transparency of opal glasses for long waves. Most of the light, however, is irregularly reflected in the opal glass; and the point or area at which the beam R strikes the opal sheet becomes a secondary radiator, and radiates the light with a distribution curve corresponding to the shape of G—that is, with a maximum intensity at D at right angles to the plane of G (as illustrated).

Refraction C *and* D.—These diagrams illustrate vertical and horizontal sections respectively of the "Holophane" clear glass prismatic (ribbed) globes. C shows a typical contour for the internal prisms, and it is seen that such ribs or prisms produce excellent horizontal diffusion. D shows the contour of two of the external horizontal ribs or prisms; usually each one has to differ from its neighbour, so that the desired (predetermined) light distribution may be effected. These prisms diffuse the light from the vertical plane as well as redirect it in the desired manner.

The following table summarizes on broad lines the properties of the various material referred to:—

Material.	Its Power for		
	Diffusing.	Reflecting.	Refracting.
Clear prismatic glass	Good	Excellent	Excellent
Opal or white glass	Excellent	Limited	..
Sand-blasted or acid-etched glass	Limited	..	..
Mirrored glass	..	Excellent	..

The Measurement of Illumination.

In the measurement of illumination the unit used is the foot-candle; and therefore a brief description of its relation to candle power may be of value.

Consider a light of one candle-power intensity in all directions placed at the centre of a hollow spherical shell of 1 foot radius. This light would illuminate the inner surface with an intensity of 1 foot-candle, and the illuminated area would be 4π (12·56) square feet, since the surface of a sphere is found by multiplying the square of the radius by the constant 4π.

If the same light were placed at the centre of a spherical shell of 2 feet radius, the quantity of light originally distributed over the area of 4π square feet would now be distributed over an area of four times 4π (50·28) square feet. It is readily seen that the illumination on the larger surface would be a quarter of a foot-candle, since the total amount of light is the same in both cases, and the larger surface is four times the smaller. Hence, normal illumination in foot-candles is found by dividing the candle power of the source by the square of its distance from the surface illuminated.

$$\text{Therefore, normal illumination (in foot-candles)} = \frac{\text{candle power}}{\text{distance squared (ft.)}}$$

$$I_n = \frac{CP}{d^2}$$

This rule, known as the "Law of Inverse Squares," does not apply where light falls obliquely on the surface under consideration. In this case the formula becomes

$$I_h = \frac{CP}{d^2} \operatorname{Cos} 3a$$

Where a is the angle between the ray of light to the point under consideration on the illuminated surface and the vertical line through the light unit.

We often speak of light as a cause and illumination as the effect; and it is this effect or illumination (expressed in foot-candles) which forms the basis of all lighting calculations.

As pointed out before, the illumination values can easily be calculated for a given source, having its polar distribution and actual candle power values given. But there are instruments on the market—notably the "Holophane Lumeter"—which enable one to measure the illumination of practical installations, so as to prove or disprove calculated or published data.

The instrument is extremely portable and able to be carried about with the ease of a small camera, and measurements are able to be made at a great rate. It is also able to be used for obtaining the polar distribution of a source by measuring the illumination obtained, on a surface placed normal to the source, at different angles around the vertical axis. Calculating the candle power by the formula C.P. $= I_n d^2$.

Reflection Value of Surroundings.

In calculating illumination values, it is necessary to take into account the effect produced by the light reflected on to the working plane by surrounding objects. It is quite possible to obtain an increase of as much as 80 per cent. in the illumination on a horizontal plane when the room is small and the surroundings light. Speaking broadly, the increase in the actual illumination is as follows:—

Condition of Ceiling.	Condition of Walls.	Increase over Calculated Illumination.
Very dark	Very dark	0 per cent.
Medium	Very dark	15
Medium	Medium	40
Very light	Very dark	30
Very light	Medium	35
Very light	Very light	80

In very large rooms the effect of reflection from the walls would be less important, though ceiling reflection must be considered. In large spaces, however, the decreased importance of wall reflection is to some extent counterbalanced by the effect of distant light units; their tendency being to improve both the average intensity and the uniformity.

Reverting to the foot-candle as the measurement of illumination instead of the candle power of the source, one may ask, What is the visual effect of one foot-candle illumination? What intensity is required for various classes of service? It is obvious that dark objects require more illumination than light; and the following table has been compiled from the researches and agreed opinion of acknowledged authorities.

Foot-Candle Intensities.—The following table of average foot-candle intensities are recommended for the various classes of service indicated:—

Art gallery (walls)	5·0	Museum	3·0
Automobile showroom	6·0	Office (general)	4·0
Bank (general)	2·0	Power-house	2·0
Bath (public)—		Railway carriage	2·0
Dressing rooms	1·0	Reading (ordinary print)	4·0
Swimming bath	2·0	Reading (fine print)	6·0
Billiard room (general)	1·0	Residences—	
Billiard table	15·0	Porch	0·5
Courts—		Hall (entrance)	1·0
Squash	6·0	Drawing room	1·5
Tennis	6·0	Sitting room	1·5
Church	3·0	Dining room (general)	0·5
Desk	4·0	(Local on table)	4·0
Drawing office	8·0	Kitchen	2·0
Drill Hall	3·0	Bedroom (general)	1·0
Engraving	10·0	Dressing table	4·0
Factory—		Restaurant	3·0
General illumination only where additional special illumination of each machine or bench is provided	1·5	Rink (skating)	3·0
Local bench illumination	4·0	School—	
Complete (no local illumination)	4·0	Classroom	3·0
Garage	2·0	Corridor	0·5
Gymnasium	2·5	Sewing	6·0
Hospital—		Shop window—	
Corridors	0·5	Light goods	8·0
Wards (with no local illumination supplied)	1·5	Medium goods	16·0
Wards (with local illumination supplied)	0·5	Dark goods	20·0
Operating table	12·0	Shops (interior)—	
Laundry	1·0	Light goods	5·0
Ironing table	4·0	Dark goods	10·0
Library—		Station (railway)	2·0
Stock room	1·5	Street—	
Reading room (with no local illumination)	4·0	Business (not including light from shop windows, &c.)	0·5
Reading room (with local illumination)	1·0	Residence	0·1
Market	3·0	Country roads	0·05
Moving picture theatre	2·0	Studio	4·0
		Theatre—	
		Lobby	3·0
		Auditorium	2·0
		Train shed	1·0
		Typesetting	8·0
		Warehouse	1·5
		Wharf	1·0

The minimum illumination at any point should not be less than one-half the values stated above.

DISCUSSION.

Mr. W. G. S. Cranmer (Willenhall), who opened the discussion, said it was almost impossible to criticize the paper, which was more useful for reference than for anything else. The bulk of the paper was matter of fact rather than matter of opinion. There was no doubt that the question of illumination was one which was coming very much to the fore, and one in which gas engineers would have to take greater interest than perhaps they had taken up to the present. In many cases, illumination had been by rule-of-thumb, and had been done in quite a haphazard manner. No doubt, very good results had been obtained by this method of working; but he thought that if one knew the actual value of a unit which one was using, and knew how the light was distributed from that unit, then the light could be used with more intelligence and to greater advantage. When all was said and done, probably rule-of-thumb methods were really methods of experience to a very great extent; but when one knew the value of the unit there was less likelihood of waste of light, and the distribution of the light would probably be better. Of course, there was one point to be remembered in all illumination questions; and it was that they could not always consider the actual efficiency of the light. They had to look at the matter from the æsthetic point of view in some cases. A lady in a drawing room, for instance, was not so much concerned about the light diffusion as how it suited the room, and how the colour of the globes matched the general decorations. This was one of the difficulties they had to meet, because it was often the case, perhaps, that a lady wanted to buy some

globes, and she did not consider their efficiency; all that troubled her was whether they were pretty and whether they would suit the decorations of her room. He thought that at the present time they were getting some rather good illustrations of shop window illumination. In many towns, and particularly in Birmingham, where the light had to be hidden, the illuminating effect of the window was much better than it was previously. He referred to the case of a shop in Birmingham where previously the lighting consisted of clusters of inverted burners which stared one straight in the eye, and the illumination was certainly most unsatisfactory. Now the blinds had had to be drawn about one-third of the way down; the result being that the lighting of the window was very much improved. He also alluded to the case of a shop where incandescent gas lighting was used, and a number of electric bulbs were dotted about the window, causing a dazzling effect. Now they had had to shade them, and the lighting was very much better. They could learn many lessons from their electrical friends in the way of illumination. He did not say they were always right, by any means; but in many cases they had certainly done very well in this respect. Shop-window lighting was well worth studying. The paper was, he considered, most useful—perhaps more for reference than otherwise.

Mr. G. STEVENSON (Long Eaton) said that in these days, when they obviously had to make the most they could of lighting, gas undertakings ought to lay themselves out for equipping all sorts of residences, houses, shops, &c. Were they to suggest scientific lighting to the ordinary plumber, it would have to be provided for specially in the contract. He had used the Holophane globes very successfully—particularly for school lighting. Now that most counties had their own architects, it was up to gas engineers to give the best impression to the education authorities. The Holophane Company had almost entirely neglected gas—all their illustrations had reference to electricity. The study of illumination for specific purposes was a most fascinating one, and one which required very much more study at the hands of gas undertakings than it had hitherto received. Electrical undertakings were generally staffed by more modern men in many respects. They very often had to take business from an established customer; and they were bound to exercise a little more investigation and to go into the matter with a little more scientific detail. Mr. Stroud's illustrations bore out very distinctly that the policy of the distribution of lighting with an inverted gas-burner was after all the best distribution they had seen. This was very striking, and a point that they ought to mentally note, because it was often alleged that their lighting was badly placed and badly arranged. But it had been shown that if they could make the best use of inverted burners for specific buildings, they could at any rate hold their own with any kind of lighting on the market.

Mr. VINCENT HUGHES (Smethwick) said he would have thought more highly of the paper if the author had told them something about the cost of the specialities he had dealt with. He was comparing these beautiful globes of his with some very common Austrian or opal globes, and naturally he got very much better results. But he did not say what he was paying for these "precious" globes.

Mr. W. C. JONES (Brierley Hill) alluded to the durability of the globes, and said he had used Holophane globes for many years in his own house, which was entirely lighted up with them. He had, however, in one or two instances some difficulty through the globes breaking by contraction and expansion. He should like to know whether this was a matter which had been improved.

The PRESIDENT thought that they, as a gas industry and as gas engineers, deserved as much looking after on the part of companies like the Holophane as the electrical industry.

Mr. STROUD, replying to the remarks, first dealt with the question of the durability of the globes, and admitted that some years ago they had trouble with certain types of globes. But with the type of globe now used, the greatest care was taken, and the annealing was done in such a way as to secure the greatest durability possible. One reason why they had not catered for the gas industry more extensively was this very trouble. They were now trying to overcome the difficulty; and every care was taken with pressed glass. Blown glass was more durable for heat-resisting than pressed glass. The trouble with mantles was that if they broke, and a point of flame got on the glass, it would crack; but if they had an inner chimney it would not. Care must be taken to see that the mantle was always kept in proper working order. As to the question of cost, this always arose with the gas people. They must remember that with Holophane globes they were "buying a system." They were not buying a piece of glass, but a system which had been worked out. An enormous amount of money had been spent on it, and scientific people were employed to design the moulds. The things were not designed merely for prettiness. Customers bought a system with the glass; and they really did not pay so much more for it. With reference to the diffusion of light from an inverted gas-burner, it was certainly the best distribution possible with any illuminant at the present time, on the lower hemisphere.

At a meeting of the Gas Sub-Committee of the Blackburn Town Council last week, 33 applications were stated to have been received for the position of Gas Engineer and Manager, advertised recently in the "JOURNAL." The number was ultimately reduced to eight; and a small Committee was appointed to visit each of the applicants at his own works, and to report.

SULPHUR AND CYANOGEN EXTRACTION FROM COAL GAS.

A French Patent.

A patent has been taken out for France by MM. Ciselet and Deguide for a process for the extraction of sulphur and cyanogen from the gases resulting from the distillation of coal. The inventors have applied for English patents for the process; but they have not yet been granted. The following is a translation of the French specification [No. 471,234, April 22, 1914].

To remove sulphur and cyanogen from gas, the most effective method is to treat it with a ferric hydrate precipitate, which throws down the sulphur and cyanogen respectively in the form of iron sulphide and cyanide of iron, which can be regenerated with a current of air so as to be in a condition to continue its purifying action. Hitherto it has not been possible to extract from the precipitate metalloid sulphur and cyanogen simultaneously in the form of ferrocyanides, without loss and in a state of great purity. To effect this object, according to the invention, after the sulphur and cyanogen have been precipitated with ferric hydrate and regenerated with air during a sufficient length of time to enrich the mass to the required degree, the latter is treated with a suitable acid, such as sulphuric or hydrochloric acid, which dissolves the ferric hydrate, forming sulphate or ferric chloride, while the sulphur and ferrocyanides, remaining insoluble, are separated with an alkaline liquid. The ferrocyanides can be collected as they are, or calcined in a closed vessel with lime to produce ammonia. The sulphate or ferric chloride produced during the operations can be utilized to reconstitute ferric hydrate, by means of which purification of the gas can be continued. As purification of the gas and the extraction of the precipitated products can be carried on simultaneously and without interruption, while the regenerated products enter into the reactions, it is claimed for this process that it has the double advantage of economy and continuity. Moreover, the reactions are clearly defined, and do not cause the formation of any useless compound or the production of toxic vapours; so that the final products are collected in a state of great purity, while the manipulations are simple and free from danger.

A method for the application of the process is as follows: The gas is first brought into the presence of ferric hydrate, suspended in a liquid, which absorbs the sulphuretted hydrogen and hydrocyanic acid in the gas, and precipitates the sulphur and cyanogen in the form of iron sulphide and iron cyanide. The ferric hydrate can be very easily recovered, as required, by decomposition of the iron sulphide with a current of air or injected air; while the sulphur is precipitated in metalloid form. These operations can be conveniently effected by making the liquid circulate between mixers, through which the gas continually passes, and one or several tanks into which air is injected. Recovery of the ferric hydrate is stopped when the percentage of sulphur and cyanogen in the precipitate is considered as being sufficient to justify its extraction.

In order to separate the sulphur and cyanogen from the mixture of ferric hydrate and sulphate of ammonia, the latter is removed in a filter-press; the residue being treated with sulphuric acid so as to render the iron soluble while the sulphur and cyanogen remain insoluble. The cyanogen passes into the form of an insoluble mixture of ferric ferrocyanide, ferrous ferricyanide, and ferrosoferric cyanide, which is deposited with the sulphur. The solution of iron sulphate is removed by filtration. The insoluble residue of sulphur, ferrocyanides, and ferricyanides is treated with an alkaline solution (soda, potash, or alkaline carbonates), which dissolves the cyanogen compounds in forming alkaline ferrocyanides, while the metalloid sulphur remains insoluble and can be separated by filtration. On the other hand, the regenerated ferric sulphate is added to the sulphate of ammonia, and again subjected to the action of the gas, ammoniacal liquor, or the vapours therefrom, in order that it may reconstitute the ferric hydrate.

This process does not in any way impede the recovery of ammonia, for, when the solution of sulphate of ammonia is sufficiently concentrated, instead of being added to the ferric sulphate it is discharged to be evaporated. The same results would be obtained by substituting ferric chloride and hydrochloric acid for ferric sulphate and sulphuric acid; and the process is applicable whatever may be the method of precipitating the ferric hydrate, and of separating the sulphur from the ferrocyanides.

In certain cases there may be an advantage in transforming into ammonia the cyanogen of the alkaline ferricyanides and ferrocyanides obtained. For this purpose milk of lime is added to them, and so mixed as to form a paste, which is calcined in a closed vessel, preferably a muffle furnace. Under the action of heat the lime displaces the nitrogen, and transforms it into ammonia, which is liberated, and collected by any known method—for example, in an acid bath. The calcined mass, freed from nitrogen, is then washed with water to recover the alkali which was combined with the iron and cyanogen, and which can be again employed to separate the sulphur from the cyanides of iron. Besides making it possible to effect, in a very simple manner, the transformation of the nitrogen into ammonia, this operation has also the advantage of regenerating the alkaline solution utilized to separate the sulphur.

COMPRESSING INSTALLATIONS.

By R. G. Marsh, of Birmingham.

[A Paper read before the Midland Junior Gas Association, March 13.]

The designing and fixing of plant for the purpose of compressing gas on consumers' premises, either for lighting or manufacturing purposes, has been an important feature in the Birmingham area of gas supply. The rapid development of the use of high-pressure apparatus for many purposes has necessitated during the past few years the fixing of many compressing installations on manufacturers' premises which are situated off the route of the high-pressure distribution mains; and although the general lines of the arrangement of the apparatus are similar, the working-out of the details required a great deal of care and consideration of the special requirements of the case.

The compressor is fixed in the most convenient part of the works, and is usually driven by belting from existing shafting or by a small gas-engine or motor specially installed for the purpose. In all cases, of course, the necessary power for driving the compressor has to be provided by the consumer. A low-pressure meter is usually fixed to supply the installation, though in many instances, where the plant is small, the existing low-pressure supply is sufficient. In all cases the gas is metered on the low-pressure side before passing to the compressor.

The Gas Department will provide the plants complete on simple hire terms or hire purchase, or the consumer is free to purchase his own compressor. Broadly, such installations may be divided into two classes—those for lighting installations, and those for furnaces or manufacturing apparatus.

Lighting Installations.

The erection of plant for lighting installations is a comparatively simple matter. There is no need to go into the details of same—they are too well known to require much description.

A good make of rotary compressor is sufficient to give the pressures required by modern high-pressure lamps. It is necessary that the machine be fitted with a reliable form of relief-valve to allow of any surplus gas passing back from the high to the low pressure side of the machine when it is not working up to its full capacity, and to maintain a constant pressure on the outlet side. Some form of dead-weight valve is to be preferred to a spring-loaded valve for this purpose; and most of the rotary compressors now on the market are fitted with this form.

Lubrication.

A most important item to be remembered is a suitable form of lubricator—one that will give just enough oil, and not too much. One of the well-known makes of compressors is fitted with an automatic sight-drip feed-lubricator, which is very satisfactory, provided a certain amount of attention is given to the adjustment of it. The oil reservoir is on the outlet side of the machine; and the oil is therefore under pressure when the machine is working. The oil-pipe is led to the lubricator which is fixed on the low-pressure side, and the gas pressure thus utilized to force the oil up to the level of the drip feed, where the flow of oil is regulated to the required amount of a few drops per minute. The oil is carried through the machine by the revolving blades, and ultimately drains back to the reservoir. The periodical draining-out of the dirty oil and the recharging of the reservoir with fresh is all that is required; the actual lubrication being automatic—starting and stopping with the machine.

The quality of the oil used is a most important point, many troubles with machines arising from the use of an unsuitable oil. A good brand of light gas-engine oil has been found very satisfactory.

Bye-Pass Valves for Automatic Lighters.

When the lamps being supplied are fitted with automatic lighters, it is necessary for a simple form of automatic bye-pass valve to be fixed on a pipe connecting the inlet and outlet of the compressor. This valve is kept tightly on its seat by the gas pressure when the machine is working, but opens and allows low-pressure gas to pass direct to the pilots of the lamps when standing. A form of valve that is used for this purpose is shown in fig. 4, and described later on. A similar apparatus of lighter pattern, with a plain disc valve, can generally be obtained from rotary compressor makers and used for the purpose.

Anti-Fluctuators.

Before leaving the subject of rotary compressors, there is one thing to be mentioned which is often overlooked, or considered unnecessary, by compressor makers, but which we have found to be an important item, and that is some form of anti-fluctuator to prevent low-pressure supplies in the same or neighbouring premises being affected by the working of the machine. We have had considerable experience and trouble in this respect.

At first the ordinary form of gas-engine anti-fluctuator was adopted—viz., a cast-iron casing provided with a flexible canvas or prepared rubber diaphragm actuating the anti-fluctuator valve. Although the action of the compressor is not the same as that of a gas-engine in taking its gas supply, this was found to act very satisfactorily in preventing oscillation. It was a source of serious danger, however, as when the compressor was stopped the bag was distended to its utmost by the returning high pressure gas on the system of pipes on the outlet side. The valve, of course, in the bag closed tightly, and the diaphragm was called upon to withstand the full pressure, which it was not strong enough to do. The diaphragms were strengthened by several thicknesses of material, but were still unsatisfactory. Our practice now is to avoid any such weak points in a system, and to construct the whole apparatus sufficiently strong to withstand double the maximum pressure to which it is ever likely to be subjected under working conditions.

For furnaces and manufacturing appliances, requiring pressures up to 12 lbs. or 13 lbs. per square inch, rotary compressors are unsuitable, and machines of the reciprocating type are used. In dealing with these pressures, very different arrangements have to be made for the proper control of the pressure, as also for safe working.

A diagram is submitted of part of the connections and a photograph of an installation at a large manufacturing works in Birmingham where two four-cylinder reciprocating compressors are

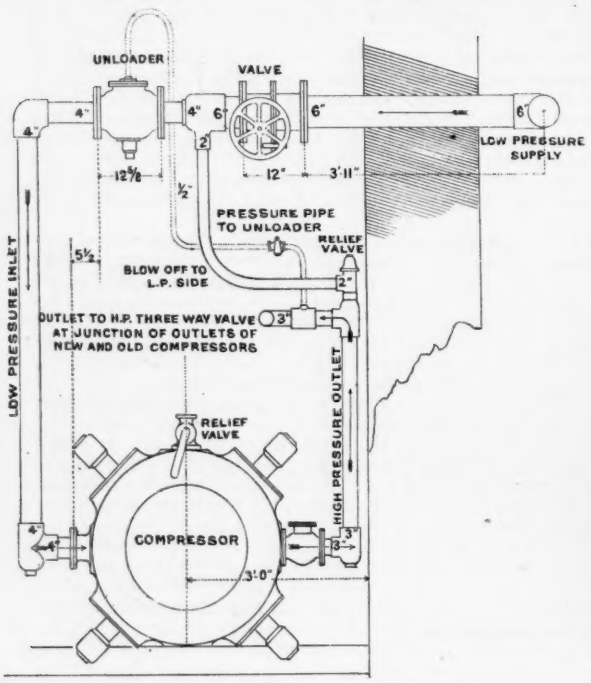


Fig. 1.—Connections for 10,000 Cubic Feet per Hour Compressor.

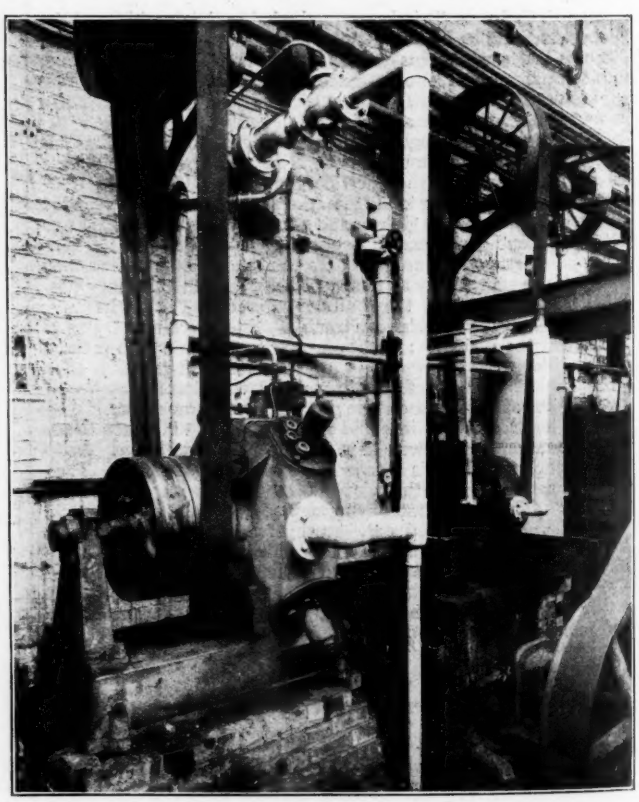


Fig. 2.—Photograph of 10,000 Cubic Feet per Hour and 5000 Cubic Feet per Hour Compressors.

fixed; the larger machine being capable of compressing and delivering 10,000 cubic feet per hour, and the smaller one 5000 cubic feet per hour. (Figs. 1 and 2.)

The original installation at these works consisted of the smaller machine only, which was supplied by a 1000-light low-pressure meter. This, however, soon proved too small for the requirements, and the larger machine was fixed, supplied by a 2000-light meter. One week-end the supply pipe was transferred to the large meter; and during working hours the new machine was fixed and all materials prepared and the new connections made as far as possible. The next week-end the transfer was made over to the new machine. Thus the supply of high-pressure gas was uninterrupted during working hours.

In this particular installation an anti-fluctuator was not found necessary, as the machine is supplied by a long length of 6-inch pipe from the meter, which in itself forms a large reservoir, and effectually damps-down any little oscillation there may be. Further, the action of the machine itself is not such as is likely to cause oscillation.

As can be seen from the appearance of the machine, the four cylinders are arranged radially, the connecting rods all working on one crank, on the lines of the well-known Gnome aeroplane engine. Unlike the Gnome engine, however, the whole machine is enclosed in the main casting. There are no inlet valves; the central crank chamber forming the inlet chamber, into which the low-pressure gas is supplied.

There is an ingenious arrangement of ports in the gudgeon pin end of the connecting rods. During a portion of the revolution of the crank in which one piston is being drawn inwards towards the centre, the connecting rod is at such an angle as to uncover the ports—thus affording an open gas-way between the crank case and the outer side of the piston. The movement of the piston in this way simply displaces the gas from the crank case to the cylinder. Upon reaching the extremity of its inward stroke, the ports are closed by the angular movement of the connecting rod. The gas is then compressed by the outward movement of the piston and escapes through the automatic outlet valves into the outlet chamber, which forms a belt round the entire machine, connecting-up all four cylinders. The whole machine is, of course, water-jacketed, and a continual stream of water is kept flowing through the machine, to take away heat generated by compression.

The interior of the machine is readily accessible by the removal of the inspection cover seen on the side; and the crank gear and all four pistons can, if required, be taken out in a few minutes, and re-assembled with equal ease.

It will therefore be understood that the action of the machine is not likely to cause oscillation, as each cylinder takes its supply of gas in turn during one revolution. The flow of gas is thus very uniform when the machine is working, and there is no sudden and rapid sucking effect on the supply pipes as would be the case with a single-cylinder machine.

In this installation, as in all others where reciprocating machines are used, there are several other special appliances used to control and regulate the pressure which are worth mention and description.

Unloader Valve.

The first is the unloader valve (fig. 3), which is fixed on the supply pipe on the inlet side of the machine. The object of this apparatus is to save power consumption and to regulate the amount of energy required to drive the machine somewhat in proportion to the amount of gas being compressed. As will be seen from the section, it consists of a small piston and cylinder in a vertical position. The piston rod is connected to a valve A, which, when moved downwards, comes on to its seat B and shuts off the supply of gas to the machine. The direction of flow of gas through the apparatus to the compressor is indicated by the arrows. Beneath the valve is a spring in compression, adjustable by the adjusting screw shown. The spring tends to keep the valve open; and the strength of it depends upon the area of the piston C and the pressure of gas which is required to be maintained on the outlet of the machine. A small pressure pipe connects the top of the cylinder with the high-pressure container on the outlet side of the machine; so that the piston is always subject to the outlet pressure.

The spring is adjusted so that when the predetermined pressure of (say) 12 lbs. per square inch is reached, this pressure, acting over the area of the unloader piston, is sufficient to overcome the resistance of the spring, and the valve is pressed down on to its seat and shuts off the supply to the compressor. When this occurs no work is done by the machine in compressing, and it runs round on friction load only—a vacuum being caused in the crank case. As soon as the pressure falls, the valve is re-opened and the supply renewed.

From an actual test on the large machine it was found to require 12·5 H.P. to drive it on full load, and 4·1 H.P. only with the inlet closed and the machine working on vacuum. It will be realized that, under these conditions, it is very important to be certain that the whole machine and case is sound both for pressure and vacuum, as if any leaks occur between the crank case and the outside, air will be drawn in to mix with the gas when the unloader comes into action, which at least will be detrimental by lowering the calorific value of the gas, and, if the leak is more serious, may cause a dangerous explosive mixture to be obtained in the container and outlet pipes. It is equally necessary for the machine to be sound for pressure, as although in the crank case under ordinary working conditions only ordinary gas pressure obtains, yet when the machine is stopped it is possible for the accumulation of high-pressure gas on the outlet side to leak back through the automatic valves at the top of the cylinders into the crank case and build-up pressure when the main inlet valve to the machine is turned off.

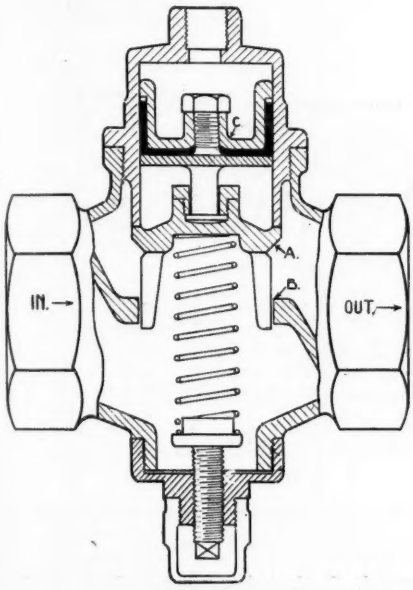


Fig. 3.

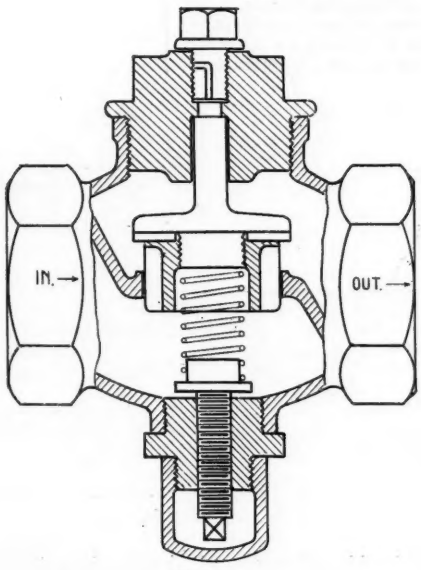


Fig. 4.

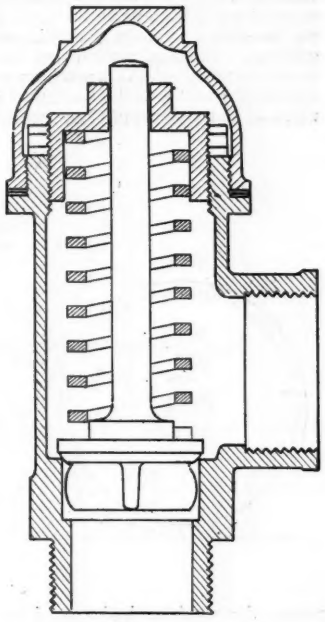


Fig. 5.

This building-up of pressure on the low-pressure side when the machine is stopped is a serious matter, and might possibly lead to more serious results in installations where the practice is, when finishing work, first, to turn off the furnaces, then stop the machine, and then turn off the gas at the inlet of the meter. The gradual creeping-up of the pressure occurs by leakage back from the container and outlet pipes through the machine, along the low-pressure pipes, and into the meter itself. This will result in first blowing the seals of the meter, and in severe cases may even cause the meter to burst.

On the completion of an installation, instructions are always given to the man in charge that the proper course to take when stopping is first of all to stop the machine, then allow the furnaces to burn themselves out and the gauge on the container to fall to zero before turning off the control taps to the furnaces, and, last of all, to turn off the gas at the meter. Then all is safe, and there is no possibility of any backing-up occurring. It is, however, impossible to insure that these instructions will always be carried out, as the human element comes in and the attendant forgets, or a temporary man is told-off to stop the apparatus, who goes about it in the easiest and quickest way, with unfortunate results.

Non-Return Valve.

It is therefore advisable to fix on the low-pressure side some form of non-return valve, which will freely allow gas to pass towards the compressor, but closes tightly on to its seat when the flow stops and there is a tendency for gas to pass the wrong way. Such a valve is shown in fig. 4. It is of an ordinary mushroom type, the weight of which is just balanced by the light spring underneath. From its construction it will be seen that there is very little obstruction to the passage of gas in the direction shown by the arrows; but pressure on the outlet side simply closes the valve tighter on to its seat. This is given simply as a type that may be used; a reliable form of flap-valve, or a mercury valve, provided the seal is deep enough to withstand the maximum possible pressure, may be used.

Starting-up a Plant.

In the same way it is equally important to follow the correct method of procedure in starting-up a plant. On one occasion a great deal of inconvenience and mystification was caused us by a compressing plant being started-up wrongly. Fortunately no accidents resulted; but explosions in neighbouring houses might have been caused had the starting of the plant taken place at a different hour of the day.

On several occasions we had cases of street lamps being found extinguished in the early morning but with the gas still escaping through the burners. This occurred in an area surrounding the site of a fairly large reciprocating compressor, and happened several times before the cause was found. The firm were working continuously night and day through the week; the machine being stopped on Saturdays and restarted on Sunday midnight. It was on Monday mornings that the street-lamps were found extinguished. The explanation was this. The attendant was in the habit of first oiling-up his machine and seeing all was in order; then starting it; and after he had got it going he turned on the outlet valve of the meter and then the inlet valve. In the interval, of course, the machine had caused a considerably high vacuum in the interior of the 1000-light meter, and the act of turning on the inlet valve caused a very violent rush of gas into the meter and a sudden lowering of the pressure in the 12-inch and 30-inch street mains, which was sufficient to extinguish all the lights in the neighbourhood. Immediately the normal pressure was resumed, the gas escaped from the lamp-burners. When steps were taken to insist upon the meter valves being turned on before starting the compressor, the trouble disappeared. But one can realize what serious results such a practice might have caused. It speaks well for the meter that it stood such treatment without damage.

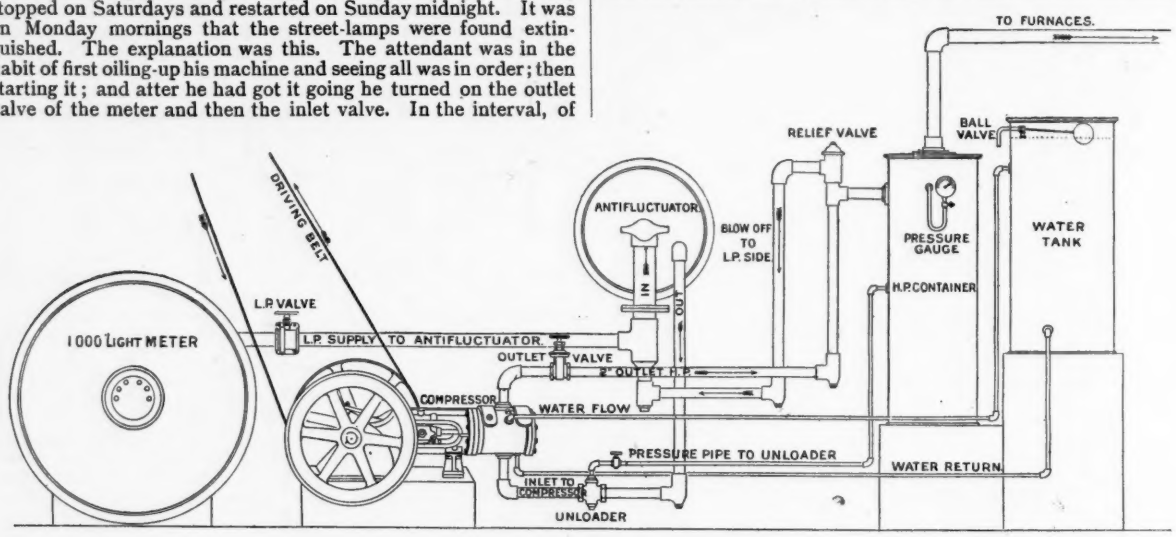


Fig. 6.

Lubrication of Four-Cylinder Machines.

The lubrication of the four-cylinder machines in No. 1 diagram is by means of three oil-pipes from an oil-box fixed on the top of the machine led to the two top cylinders and the crank respectively; the two lower cylinders relying on drips from the two upper ones. The flow of oil is regulated by sight-feed lubricators. The oil-box is fitted with an air-tight lid, and a pressure pipe connects it with the inlet-chamber. The object of this is, of course, to equalize the pressure, so that the oil-feed is regular whether the machine is working under vacuum or not. The main bearings are fitted with oil-rings. The pulley end of the crank shaft is fitted with a ball-race to take up end-thrust when the machine is running under vacuum; and where the shaft passes through the side of the main casting it is fitted with a circular revolving seal ring of V section, kept up to its seat by springs to prevent leakage in or out at this point.

On the high-pressure side of the machine is fixed a spring-loaded relief valve, set to blow off at about 1 lb. higher pressure than that to which the unloader is adjusted. This blows back through a curved copper pipe to the low-pressure side, part of which can be seen in the photograph. A similar relief-valve is fixed on a branch of the high-pressure outlet pipe, and blows off through a connecting pipe to the low-pressure side of the compressor. The object of these is to act as safety-valves to the system in the event of any failure of the unloader, and would be sufficient in themselves to prevent an undesired accumulation of pressure on the outlet side; but, of course, without the unloader the machine would take full power to drive it, whether all or none of the furnaces were being used.

Fig. 5 is a section of the relief valve, which shows its simple construction.

The general arrangement of a smaller installation is indicated in fig. 6. The furnaces are supplied by an 8 by 8 horizontal double-acting machine, belt-driven. The anti-fluctuator fixed is a gas-engine bag, but with the flexible diaphram removed and a ¼-inch iron plate substituted. The anti-fluctuator valve, which originally was moved by the flexible diaphragm, is in a fixed position, the best adjustment of which was found by trial. It effectually prevents oscillation without causing any throttling of the gas supply.

This machine is fitted with automatic inlet and outlet valves, otherwise the general arrangement is similar to the larger installation, and all the connections are easily understood from the diagram. There is only one relief-valve arranged to blow-back into the inlet side of the gas-bag, as shown.

Our practice recently in connection with containers and anti-fluctuators upon the low-pressure side of the compressors is to discard the use of gas-engine bags and metallic diaphragms on account of their expense. We use instead cylindrical galvanized iron containers about 3 feet long by 18 inches diameter. A transverse partition is provided about 1 foot from one end with a 2-inch hole in the centre. The low-pressure gas enters the tank at the end nearest the partition, and the outlet to the machine is taken from the other end. In the hole in the partition is fitted a piston type of valve kept closed by a very light spiral spring. The valve is opened by the suction of the compressor, and closes by the spring and prevents oscillation and back-pressure on the meter. A manhole is provided on the side of the container, to allow of fixing and adjusting the valve.

Provision for Condensation.

It may be of interest to mention that provision has to be made on the outlet side of compressing installations for the periodical draining-away of condensation, which, as is only natural to expect, takes place in fairly large quantities. In both the plants illustrated this is provided for by a drain cock fixed in the base of the container. It should be the regular duty of the man in charge to attend to this; otherwise, in time, undesirable quantities of water will be accumulated in the container.

Conclusion.

The subject of high-pressure air used in conjunction with low-pressure gas for furnace work has not been dealt with, as, although there are many such plants in use, my object has been to describe the more important and perhaps the better of the two systems.

As mentioned at the commencement of the paper, every installation requires consideration on its merits and the special requirements of the consumer; but I trust there may be something in these notes to be of general interest. The work is very interesting, and, so far as our experience has gone, has necessitated in several instances the design and manufacture of some of the special apparatus described, which we have found necessary to provide for the safe and satisfactory working of the various plants.

DISCUSSION.

Mr. W. Lycett (Birmingham) remarked that the paper contained a great deal of useful information; and he agreed generally with what the author said. Really, there was not much chance given to the members for criticism; but he would like to

ask Mr. Marsh about the lubricator, which was a very important matter in connection with these compressors. With the system of automatic lubrication referred to in the paper, did not the author find that the oil which drained back to the reservoir after it had been through the machine got very dirty, and contaminated the whole of the oil? He (the speaker) found that as a rule it did so. It became impregnated with tarry matter, and got very tacky; and when the oil reached this state, the machine did not seem to give its proper output, until it had been working some time and got warm. Personally, he believed in oiling direct—having a good sight-feed, and good oil running through the machine, and then taking it off in a syphon. In this way, it was possible to strain the oil; and afterwards it might be used again for some other purpose. It was very important to keep some good oil in the compressor, if it was to last and work well. With regard to the kind of valve that was sent out by the makers for giving the pressure, in the case of some of them, at any rate, the valve was weighted for a predetermined pressure, and there did not seem to be much allowance made for re-adjustment, if a greater or less amount of pressure was required. The fitting of a non-return valve appeared to him to be a very important point. He remembered a case in which there was no non-return valve provided. It was a rotary machine, and the people were in the habit of turning the gas off at meal-times, and then stopping the compressor a few seconds afterwards, with the result that the pressure backed-up into the meter. Therefore it was highly important that there should be non-return valves to every installation. Looking at fig. 6, he did not know whether the author had omitted to put a non-return valve in there; but there did not appear to be one shown. It should be worth while fitting one, because if the relief-valve should fail—which he admitted was not likely, though there was a possibility of it occurring—there would be nothing to stop the whole of the pressure in the receiving-vessel coming straight back into the meter.

Mr. L. STURDY (Birmingham) asked what was the cost of compressing 1000 cubic feet of gas by the method described by the author. The unloader valve seemed a splendid arrangement, particularly when one looked at the figures of cost of running a compressor with and without it. The whole subject was one on which they would like to know more. Most gas undertakings had no high-pressure mains; but this did not mean that manufacturers in their districts should have to go without the benefits of high pressure. In connection with the galvanized iron containers alluded to in the paper, he would be glad to know what was the gauge of the metal usually employed in the making of them.

Mr. F. W. DEANE (Wednesbury) said the author told them in the paper that the subject of high-pressure air used in conjunction with low-pressure gas for furnace work had not been dealt with, as, although there were many such plants in use, his object had been to describe the more important and perhaps the better of the two systems. He (the speaker) had been much disconcerted to read the other day in a paper by a manufacturer of gas-furnaces an expression of opinion unfavourable to high-pressure gas, as compared with air under pressure. Those connected with the Birmingham Gas Department knew that there was a big outlook for gas in the district of Darlaston; and there the manufacturers were using air under pressure. He had, at Mr. Barrett's suggestion, been pushing the idea of using gas under pressure; but this was not made more easy when one read such a statement as that made in the paper to which he referred, where the author (he believed it was Mr. Lord, of the Manchester Furnaces, Limited) said he had tried both, and was quite satisfied that compressed air was better than compressed gas. Perhaps Mr. Marsh would say something as to this, if it was not going too much outside the scope of his paper.

Mr. W. BATT (Birmingham) said it was without doubt most necessary to have some form of anti-fluctuator with compressors, and this, as Mr. Marsh said, should be of metal of sufficient strength to withstand at least double the pressure likely to be put upon it, and be automatic in action. The flexible canvas or rubber bag anti-fluctuator was not only troublesome, but it was a very dangerous thing. With reference to an unloader of the kind described by the author, it was really essential for economical running to have this fitted. It was most reliable, and there was nothing to get out of order. Only a few days ago he had examined one of these unloaders, and found it in very good order, after it had been working for about two years. It had been attended to periodically; but the working parts were quite good. In the matter of oiling, many compressors were looked upon as faulty, when in reality the trouble was due chiefly to the employment of inferior lubricating oil, and using too much of it.

Mr. B. SKIDMORE (Smethwick), in proposing a hearty vote of thanks to the author for his paper, said that Mr. Marsh's great experience placed him in the position of being able to teach a great many of them something in connection with apparatus on the high-pressure gas system. Up and down the country there were a great many of these installations; but it was not every gas department that kept in such close touch with the subject as Birmingham. Many installations were fitted up by the makers of the plant, and controlled by the workmen of the firms using them; so that smaller gas undertakings might not get much experience of them. Birmingham, of course, had been great pioneers in this direction. One point already brought out was in connection with compressed air. Some little time ago there was a demonstration locally in connection with the Selas system of lighting; and he would like to know whether Mr. Marsh had any information he could give them as to the excellence or otherwise of this system, and whether it was suitable for furnace work. Another point was the gradual creeping-up of the pressure, by leaking-back from the container and outlet-pipes through the machine, along the low-pressure pipes, and eventually into the meter itself. This, it was said, resulted in first blowing the seals of the meter, and in severe cases might cause the meter to burst. Had the author had any experience of a meter bursting?

Mr. R. J. ROGERS (Birmingham), in seconding, remarked that the paper would be a useful one to refer to when engaged in work of this kind. Mr. Marsh had indicated another special branch which had been necessitated by the extension of the use of high-pressure gas in districts where a high-pressure gas supply was not available from the mains; and the author had had exceptional experience, not only in putting up these installations, but in finding out how not to do it, as well as how to do it. The experiences he had recorded in the paper would therefore be of great value to other engineers in different parts of the country who had these compressing installations to deal with from time to time. One point he would like to emphasize was with regard to the quantity and quality of oil that should be used for compressors where they were employed on lighting installations. In years past, he had experienced considerable difficulty with certain types of compressors, owing to the quantity of oil that had been used. The compressors had driven it to the very small gas-nipples of the burners, and thus caused trouble. This difficulty would not, of course, be felt so much when used for industrial purposes, where the jets were larger; but it was a most important matter when supplying gas through very fine orifices. The type of compressor the author referred to was, he said, on the lines of the well-known "Gnome" engine, so that it seemed ideal so far as steady flow of gas was concerned. There was equal compression at all times; and it appeared to him it was a type of compressor that ought to find more favour with gas engineers in the future, especially for dealing with large volumes of gas—say, 5000 feet, 10,000 feet, and upwards per hour.

The PRESIDENT (Mr. F. J. Ward, of Knowle) supported the vote. He was, he said, in the position of having had very little to do with high-pressure work; but he would add his meed of praise to the Birmingham Corporation for having been pioneers in this branch. They had been told that the ordinary form of gas-engine anti-fluctuator was a weak point to avoid in such systems; and careful note should be taken of what the author recommended for use in its place.

Mr. MARSH, after thanking the members for the kind way in which they had received his paper, proceeded to reply to the various points that had been raised in the discussion. As to the automatic lubrication to which Mr. Lycett had referred, he said the reservoir he had in mind contained about 2 pints of oil; and, as was mentioned in the paper, the oil used was a good brand of light gas-engine oil. This he had made a special point of emphasizing. They found that, providing the lubricator was not working so as to flood the machine with oil—that was to say, giving about 6 to 8 drops per minute—the oil would last, without getting too dirty, for about a month or six weeks, with ordinary working, for lighting purposes. The dirt held in suspension in the oil, and collected as it passed the revolving blades, had time to settle in the reservoir on the outlet side of the machine; so that for some considerable period the oil could be used over and over again without clogging-up the machine. But, of course, it was most important to see that the oil reservoir was thoroughly cleaned out periodically, and fresh oil put in. Mr. Lycett suggested a syphon for the oil to drain away; but it would have to be made so deep that it would be rather a clumsy affair.

Mr. LYCETT remarked that he did not mean a syphon as generally understood, but a vessel into which the oil could drain.

Mr. MARSH replied that the reservoir on the machine itself formed this receptacle. Then as to the adjustment of the relief valves of rotary compressors, he had generally found there was an inspection cover on the body of the machine which was removable. In this way, it was possible to get at the relief valve, and weights could be added or taken from the valve, to make it blow-off at a heavier or lighter pressure as required. Thus one could adjust the pressure within the range of the machine by the amount of the weights. It had been remarked in the discussion that the back-pressure valve was very important; and, of course, this was so. With regard to No. 6 diagram, in which there was no back-pressure valve fixed, it had been found that this was rather an exceptional installation. It worked under the usual conditions throughout the week without stopping, from Sunday night to Saturday dinner-time continuously; and when the plant was stopped, the people had been got into the way of always stopping the machine first, and allowing the pressure to escape from the burners of the furnaces, before turning off the valve. Another point about it was that the automatic outlet-valves on the compressor were such that they did not allow much pressure to creep back from the machine; so that in this particular case there was not the need for a back-pressure valve, which was advisable in the ordinary way in other installations. Mr. Sturdy had asked about the cost involved in compressing. It depended upon the form of power that was employed. The large installation he had illustrated in the paper was driven by an electric motor; and it would compress 10,000 cubic feet per hour, taking about 13-horse power. This was at the rate of about 1·3-horse power per 1000 cubic feet used. Assuming the current to cost 1d. per unit, this would work out at just about 1d. per 1000 cubic

feet compressed. The containers they adopted, both on the inlet and outlet side of the compressors, varied with the work they had to do. As a general rule, they were tested to stand 30 lbs. per square inch pressure, when they were intended to work at about 12 or 15 lbs. A question had been put by Mr. Deane as to the use of high-pressure air in conjunction with low-pressure gas for furnace work. Of course, the efficiency of the furnace would be exactly the same, burning the same quantity of gas, provided the aëration was properly accomplished, whether gas was used at high pressure or air was supplied under pressure. But the advantage of high-pressure gas for furnaces was to be found in the fact that, with high-pressure air, adjustment of the gas supply had to be made from time to time. What he meant was that, if one was working with gas at (say) 12 lbs. per square inch, the burners could be set to always draw in exactly the right amount of air through the primary air inlets; but using high-pressure air and low-pressure gas, the mixture would constantly be changing with the varying pressures of gas, and also if there was any variation in the pressure of the air supply. This was the real advantage of high-pressure gas—that no further adjustment was required after the burners had been set for this pressure; whereas with high-pressure air one was by no means certain, an hour after the burners had been set correctly, that they would still be correct. Then, again, when high-pressure air was used for (say) blowpipes for brazing, &c., it meant a double run of pipes throughout the factory, one for gas and the other for air; but for high-pressure gas only one set of pipes was required, the air being drawn in at the point of combustion. There was another risk that had to be taken into consideration. This was that if a man put his blowpipe down on the hearth, after he had finished with it for the time being, and the end of the blowpipe became stopped up against a piece of coke or coal, it was just possible—in fact, it had really happened in Birmingham—that the air would, owing to this blockage at the end of the blowpipe, force its way back along the gas-pipes, and give rise to an explosive mixture in the gas-pipes throughout the factory, and also in the meters. They had had a serious explosion, which occurred from this cause. He thought these three reasons were pretty substantial ones in favour of high-pressure gas as against high-pressure air. Mr. Batt had referred to anti-fluctuators entirely of metal. This was, of course, as had been pointed out in the paper, very important, because they might be called upon to stand the full pressure. It was also gratifying to hear that the unloader recently examined was in such good order after so long a period of working. He believed he knew the one which was alluded to, and it had proved very satisfactory so far. As to Mr. Skidmore's remarks, the question of high-pressure air he had already dealt with. He might say, with reference to the danger of the meter bursting with accumulations of pressure, that they had not actually had a case of this happening, although there had been several instances of the water being blown out of meters from the gradual creeping-up of pressure after the installation had been stopped. But, when they thought over the matter, they would see that it was quite possible the meter might burst. Assuming that one was working at a pressure of 12 lbs. per square inch, and there was a large system of pipes on the outlet side of the compressor, and a container which held a considerable quantity of gas, if the inlet to the meter was turned off, and the furnaces and the compressor stopped, and the pressure did creep back, the area of the meter-case would be subjected to a pressure of (say) 10 lbs.—it would not, of course, be 12 lbs. when it expanded back to the meter. But the ordinary cast-iron case of a large meter would not stand a pressure of 10 lbs. distributed over its area. He might say that in Birmingham they always used wet meters in conjunction with these installations. Mr. Rogers alluded to oil used for lubricating compressors being carried along the supply-pipes and causing trouble at the nipples of the burners of lighting installations. This most probably would happen in the case of a machine over-lubricated. The oil would naturally be carried in a finely-divided form along with the gas; but it simply depended upon proper lubrication of the machine to prevent this. The four-cylinder machines he had mentioned were made by Messrs. Reavell and Co., of Ipswich, who specialized in air compressors. At first there was difficulty because the firm had never had an order for a machine to meet the special requirements of this particular job. It was found that a machine which had to be absolutely sound both for vacuum and pressure was a little out of the ordinary; but eventually the machines passed the standard. The President had put a question as to anti-fluctuators. Originally they had ordinary gas-engine anti-fluctuators, which, as a rule, consisted of a cast-iron casing with a flexible diaphragm, to the centre of which was attached a valve, which was moved by the diaphragm, opening and closing the gas-way. This was objectionable, and now they used galvanized iron tanks, about 3 feet long and 18 inches in diameter. There was fitted a transverse partition; and in the centre of this partition was a piston type of valve, opened by the suction of the compressor, and closed by a spring. This acted at one time both as an anti-fluctuator and a non-return valve.

This concluded the proceedings.

Mr. Edward Wright, a well-known local Solicitor, and the Chairman of the Leamington Priors Gas Company, whose death was announced in the "JOURNAL" for the 26th of January last, left estate of the gross value of £141,249, of which £140,373 is net personalty.

LONDON AND SOUTHERN JUNIOR ASSOCIATION.

Visit to the Old Kent Road Gas-Works.

On Saturday afternoon, about sixty members of the Association spent a busy time, with their President, Mr. J. Hewett, at the Old Kent Road works of the South Metropolitan Gas Company. They assembled in the Livesey Institute, and were welcomed by Mr. T. S. F. Gibson (the Works Superintendent), who remarked that Mr. W. Doig Gibb (the Chief Engineer) was unfortunately unwell, and therefore was not able to meet the members.

Parties were conducted round the works by Mr. Gibson, Mr. Hewett, and Mr. F. A. Frost. The retort-house was first visited. Among the interesting things to be seen there was an ingenious shoot to take away the coke, as it was discharged from the retorts, with the minimum amount of fall and consequent breakage. The outside producers fitted to these houses also secured considerable attention. For the guidance of members, the following general description of the works had been prepared in advance.

The works cover about 33 acres, and are in the form of a comma, the tail of which is at the Livesey Institute. This building was the original offices of the Company, and was converted to its present use in 1906. The houses on the right of the roadway are now foremen's cottages; the one furthest from the road having been at one time occupied by Thomas Livesey, the father of Sir George Livesey. Farther on are the old retort-houses, now used for experimental work and coal-stores. There are four modern retort-houses, practically identical, in each of which are 160 horizontal oval retorts 20 feet long and 21 in. by 15 in. cross section, set in beds of ten, five high, and heated by outside producers, with forced draught. The retorts are charged by compressed air machines, and discharged by hydraulic pushers. The normal carbonization is twelve hours; and the coke is removed by wire-rope railway.

The gas is drawn from the retorts by four exhausters, driven by compound condensing "Farey" engines. The condensing plant is on the pressure side of the exhausters, and consists of four sets of reversible water-cooled tubular condensers. There follow two sets of three Livesey washers, and two tower scrubbers. Next come the primary oxide purifiers, of which there are two sets of four, followed by the catalytic purification plant for sulphur compounds other than sulphuretted hydrogen. In this plant these are reduced by 80 per cent.; sulphuretted hydrogen being formed and subsequently removed by secondary oxide purifiers, of which there are two sets of two each. The gas is then passed through a fraction of tar oil to complete the purification from naphthalene, and then through the station-meters to the gasholders, from which it is delivered to the district by fans, through governors. A sulphate works deals with the liquor produced; and the tar is sent in lighters to the Ordnance Wharf works of the Company for distillation.

The general administration of the district, about 60 square miles, is done from Old Kent Road; and in addition to the shops for blacksmiths, carpenters, and fitters, there are others for the repair of meters, stoves, testing service pipes, repairing fittings, making up and repairing out-door shop-fittings, lamps, lamp-columns, gauged, turned, and bored main pipes. These shops are fitted up with modern appliances for facilitating handling in a rapid, accurate, and efficient manner, such as specially tested gasholders for the meter-shop, sand-blast plants for the stove-shop, brass, copper, nickel, and silver plating baths in the gas-fitting shop, &c. Large stores are provided for finished work. These open on to a specially arranged dispatch department, at which the vans and motors can be expeditiously loaded. The garage in which the motors are kept is fitted with modern tools, which enable necessary repairs to be made without delay.

In order that the various departments may be kept well up-to-date in the trend of gas affairs, all appliances, as well as theories advanced, are carefully tested or looked into in elaborately fitted physical and chemical laboratories, which also do a great deal of original work, the results of which may be indicated by the domestic burner on the district, and the sulphur plant on the works.

After the inspection, tea was served in the Company's Offices, at the conclusion of which

The PRESIDENT, in the course of a few remarks, said he was glad to see such a good attendance of members; and though he knew the works very well, and had been round them many times, it had given him great pleasure to assist in showing the members round that afternoon. He would like to add that the Association (he was speaking as a member) were especially privileged, as he believed that theirs was the only visit taking place at any of the South Metropolitan Gas Company's works during the war.

Mr. F. C. BRIGGS, in proposing a vote of thanks to the Company, remarked that what struck him most in going round was the individuality of design about the works. The most interesting feature was the catalytic purification plant for sulphur compounds. He was sure the members would very greatly regret to hear of the illness of Mr. Doig Gibb. They were very much indebted to the Chairman and Directors of the Company for allowing them to visit the works, and to Mr. Gibson, Mr. Hewett, and Mr. Frost for having given up their time that afternoon.

Mr. W. L. WESTBROOK seconded the vote. Although he was not a manufacturing man, he was much interested in all he had seen, and

was particularly struck with the very fine meter making and repairing shops they had been through.

Mr. W. G. WALLER, in supporting the vote, remarked that the visit was particularly interesting to him, inasmuch as the late Sir George Livesey, the founder of co-partnership, had been brought up on these works, and had spent much of his time there. One could see there many works associated with his name.

Mr. GIBSON, in acknowledging the vote of thanks, said that it had given him great pleasure to show the members round, and he would have much pleasure in conveying their thanks to the Chairman and Mr. Doig Gibb.

Mr. W. T. LAYTON also said it had given him great pleasure to meet the members, and to hear that they had enjoyed their visit. He himself was particularly interested in the Old Kent Road Works. The works were a very great many years old, and in them they saw the design and work of many engineers who had had charge of them during their long life. There were many pleasant memories associated with the late Sir George Livesey and these works.

NEW ENGLAND GAS ENGINEERS' ASSOCIATION.

Annual Meeting in Boston.

The Forty-Fifth Annual Meeting of the New England Association of Gas Engineers was opened in Young's Hotel, Boston (Mass.), on the 18th ult., under the presidency of Mr. C. A. LEARNED, of Meriden. The following epitome of the proceedings has been prepared from the report telegraphed to the "American Gas Light Journal."

The routine business having been disposed of, the President read his address, which was historical in character, in order that there might be published a complete record of the Association's past. Fifty-four years ago, a notice was signed by four Massachusetts companies calling for a conference of gas men to deal with the question of regulating gas-meters and companies. Ten years later the first meeting of the Association was held. In 1872, Colonel Armington presented a report on the sizes of pipes for houses; and the first formal paper was by Mr. L. P. Gerald, on the use of a new patent condenser not using water. Statistics of companies were asked for in 1873; and the same year saw the formation of the first national body, the American Gas Light Association. Water gas was mentioned at the meeting in 1870; and the first paper on gas-stoves was read in 1882. The President joined in 1883; and in that year the members had the first paper on candle power. Mr. Charles H. Nettleton, who joined the Association in 1874, is the oldest member still "in harness." The total membership is now 269.

The address occupied fifty minutes in delivery, and was listened to with great attention. At its close, two reports were presented, and a telegram, letters of apology, and some correspondence were read. Then followed the reading of papers. The first was on "Concrete Piles for Holder Foundations," by Mr. F. E. Drake, of Lynn (Mass.), which was well discussed. Next came one on "B.Th.U. Losses on Medium Pressure Lines," by Mr. W. O. Brewer, of Meriden, which had a good reception, and was well discussed. One speaker—Mr. C. W. Hinman—made a hit by expressing the opinion that Commissions should regulate service and price, but leave quality to manufacturer and user, and that no candle power or calorific standard was necessary. "Industrial Fuel Gas," by Mr. W. H. Bradley, of Springfield (Mass.), was the next paper; and Mr. H. N. Tolles followed with an address on "Fundamentals of Success in Business," which was keenly enjoyed. This brought the first day's business to a close.

Two papers were left for the following day—"New Vertical Retort-Settings at Fall River," by Mr. C. W. Hunter, of Boston; and "Free Maintenance of all Gas-Lamps," by Mr. J. P. Conroy, of New York—as well as the contents of the Question-Box." This closed the meeting, which is stated to have been one of the best in the history of the Association. The new President is Mr. H. K. Morrison, of Lynn (Mass.); and the Vice-Presidents are Mr. H. C. Crafts (Pittsfield) and Dr. J. F. Wing (Everett). Mr. N. W. Gifford (East Boston) retains the post of Secretary and Treasurer, which he has held since 1899.

MAINTENANCE SERVICE IN TORONTO.

One of the papers prepared for the last meeting of the American Commercial Gas Association was on "House Maintenance Service;" the author being Mr. ARTHUR HEWITT, of Toronto. It contained particulars of a scheme which has been in operation for upwards of three years with the Consumers' Gas Company. The following are some extracts from the paper.

With the view of facilitating discussion, the author divided his subject into four parts: (1) Should house maintenance service be given, and what should be the extent of it? (2) Should the service be given without any direct charge to the consumer? (3) Is the Toronto plan effective, or can a better one be suggested? (4) Is it not a fact that the expenditure in maintenance of a sum equal to (say) 2 c. per 1000 cubic feet of gas sold is of greater and more real value to a consumer than a reduction of even 5 c. in the price of gas? The author proceeded to deal with each question separately, as follows.

1.—I think it will be admitted that the average consumer cannot himself keep his incandescent gas-burners in good condition and adjustment, and that he would not do so even if he could; he would not consent to be troubled. Therefore, if the burner is to remain in service, someone must keep it in proper working condition, or out it goes, to be replaced by electric light. On the other hand, the excellence of gas lighting with burners properly maintained will impress the consumer, and reduce the chance of change to electricity.

As to the extent of the service, I am convinced that in the final analysis gas companies will provide maintenance, either free or otherwise, for all gas-consuming appliances; and the more extensively this class of service is undertaken before the price of gas drops any lower, the better it will be for gas companies. The fact is there would not be the same demand for lower prices for gas if the service rendered by gas companies to their consumers were sufficient for the customers' needs. In bygone days the first and all-important consideration was the shareholders. In these days the way to benefit the shareholders is thought to be by satisfying the customers.

2.—From our experience, free maintenance is far more popular than any service charged for directly. Before the house maintenance system was started, we tried it on a small scale, and proved that free maintenance would be a benefit to both consumer and company.

3.—According to the Toronto plan, the house maintenance men do this: Attend to complaints in regard to lighting fixtures. Canvass from door to door for permission to clean and regulate lighting burners, clean glassware, &c. Sell, at the regular retail prices, mantles and miscellaneous goods required. [Burners are sometimes placed on trial to induce people to use incandescent burners.] Repair leaking fixtures, burners, bye-passes, &c., reporting to the office any cases requiring the service of fitters. Instal the miscellaneous fixture or fitting orders given at the sales-room, such as brackets, pendants, burners, glassware, &c. This provides a prompt delivery service on rush orders direct from the sales room. Fill orders for mantles, glassware, burners, &c., and attend to, regulate, and clean lights and glassware. [The author gave samples of the forms used.]

Each man is supplied with a grip containing a stock of miscellaneous goods which are charged to him at the regular retail prices. New men are sent out with an experienced man for at least two weeks before being allowed to work alone. The city is divided into districts, and each man is given one district to work in, and is held responsible for conditions in his territory. Three inspectors superintend the men; their duty being to see that all work is done properly. These inspectors are supplied with bicycles to enable them to get from one district to another during the day. The better men employed at this work in time prove themselves good enough for regular salesmen, inspectors, &c., and are promoted as opportunity arises for this to be done. A number of the present sales staff and inspectors have been taken from the house maintenance force.

Owing to the very low rates for electricity in Toronto, there has been a tendency to switch-on electric lighting. This is not because the people consider electric light better than gas light, but because they think it is more convenient. The service given by our house maintenance men has kept a great many people from changing from gas to electric lighting, because it has given them the same convenience. To explain this, I might state that, in nearly every house lighted by gas, bye-passes are used on most of the lights, and house maintenance men call at regular intervals to keep these lights in good condition; making the service just as good as that obtained by pressing an electric button, and giving the people the advantage of the best light. The average person knows that gas lighting is easier for the eyes and better for home lighting; and some people who are not using gas for lighting have no objection to doing so, but claim that there is more convenience in using electricity. A small proportion object to the heat of the gas-burners; but this is not so much referred to as the claim of the greater convenience of electricity.

If a customer telephones during the morning to have a mantle put on, no matter what section of the city it comes from, the order will be attended to that afternoon. This also applies if a customer requires a light to be regulated, glassware cleaned, or new burners put up. If the message is received in the afternoon, the order will be completed the following morning. We are sure that we have gained the goodwill of a great many consumers through the house maintenance service. What appeals most strongly to them is the fact that the supplies are installed at the regular retail price, and that the regulation of the burners, cleaning, &c., is done free.

Taking into consideration the gross cost of the house maintenance for a year, and crediting the amount of sales made by the men, the average cost per call is abont 8½ c. At present we are endeavouring to employ a sufficient number of good men, so that each will cover his district once every three months, which we believe will greatly reduce the cost of giving the service. The men will be enabled to make more calls and do the work faster and better.

I give below figures taken from our house maintenance records for the period from Aug. 1, 1913, to July 31, 1914. From these it

can be seen that the service is not too expensive to be operated by any large company:

Labour cost for twelve months	$13,357
Material cost for ditto	13,250
Total cost	$26,607
Less income from maintenance materials	21,778
Net cost	$4,829
Total number of calls made where maintenance was effected	56,221
Average cost per call	8·57c.
Present number of men employed	30
Average weekly wage	$10
Average maintenance call per day per man, not including "outs," &c.	7
Number of burners maintained yearly	252,995
Number of consumers where maintenance was effected, about	19,000
Number of calls per year per consumer	3
Number of mantles used yearly	42,950

These figures include only the sales made direct by the house maintenance men, as it would be impossible to estimate the amount of indirect sales; but we are positive that if credit were given for other sales made because of the house maintenance service, the cost would be almost entirely wiped out. This does not take into consideration the advertising value of this free work. During the three years we have been giving house maintenance service, improvements have been made until now we have a system approaching the point when it will support itself.

4.—A reduction of 5 c. per 1000 cubic feet is a great delight to consumers; but is it as much benefit to them as a free maintenance service? To my mind, it certainly is not; nor is it as good for the gas companies. The new business that could be obtained and the present business that could be retained by a 5 c. reduction in the price of gas would not be nearly so great as the amount of new business to be obtained and present business held by a free maintenance service.

It is gratifying to me to note the interest which is being shown, not only in the United States but also in England, on the subject of the maintenance of gas appliances in residences. I have received a great many inquiries for information regarding the results realized from the Toronto plan, and I have no doubt that it will be improved upon by many of the companies who are now interesting themselves in the matter.

LOUISVILLE INCLINED RETORT INSTALLATION.

Result of Thirteen Years' Working.

In a paper read at the last meeting of the American Gas Institute, Mr. FRANK HUBER described an installation of inclined retorts at the Louisville (Ky.) Gas-Works, and gave the results of their working during a period of thirteen years. In view of the progress of the various systems of vertical retorts, the constructional details furnished by the author have lost some of their utility; but it may be of interest to place on record the results that he obtained.

The installation was designed and constructed under the direction of Mr. A. H. Barret, Chief Engineer of the Louisville Gas Company. It consists of twenty benches of sixes, 15 in. by 23 in. at top, 15 in. by 26 in. at the bottom, and 18 ft. long, in two stacks of ten benches each—placed parallel, with a space of 25 feet between the stacks and 13 ft. 10 in. working space between the benches and the wall of the building on the discharging floor. The distance from the ground level to the discharging floor is 13 feet, and to the charging floor 27 ft. 9¼ in.

Above the charging floor are two rows of coal-hoppers, twenty in all, capable of holding 48 hours' supply. The coal is received in the storage shed (10,000 tons capacity), then hauled by cars on a narrow-gauge track to the receiving hoppers, where it is broken and elevated and distributed into the hoppers. Each bin has a slide-valve operated from the charging floor, for loading the portable retort-chargers, of which there are four—two to each stack—suspended from the tracks above the benches. Each charger has three magazines for coal for bottom, middle, and top retorts.

The coke is drawn from the retorts to shoots in the discharging floor, then drops to cars on the ground floor which are pushed to quenchers, and then to the elevator and to the coke warehouse, with a capacity of 50,000 bushels, divided into five compartments as follows: 22,000 bnshels of lump coke, and all sizes as it comes from the retort-houses; 11,000 bushels of egg coke, 1½ to 2 inches; 5700 bushels of nut coke, ¾-inch size; 5700 bushels of breeze; and 5700 bushels of pea coke, ⅜-inch size.

The lump coke, as it is taken from the large bin, passes over perforated shoots, and all coke less than 2 inches drops into pockets, and is conveyed to the hopper at the end of the coke-house, where it is re-elevated to the top, and is there separated by a revolving screen, dropping into bins according to the sizes noted above.

The erection of the retort-house was started during 1899, and the installation was completed in 1900. It began carbonizing coal on Aug. 9, 1900, and continued until March 20, 1914, when ordinary gas was displaced by natural gas.

The results given below cover the period of thirteen years.

Years.	Average Yield of Gas per Ton.	Average Candle Power.	Gallons of Tar per Ton of Coal Carbonized.	Ammonia per Ton; Liquid Ounces.	Ammonia per Ton as NH_3.	Bench Fuel in Bushels per Ton of Coal Carbonized.
1901–2–3	9,864	16·66*	12·17	209·00	4·53	7·79
1904–5–6	10,001	15·62	11·13	237·30	5·13	7·79
1907–8–9–10	10,109	15·06	12·02	244·50	5 29	8 07
1911–12–13	9,973	14·13	12·09	232·20	5·03	9·10
Total aver.	9,986·7	15·36	11·85	230·75	5 002	8·165

* Gas enriched three-quarter candle power by oil-benches.

These figures are based on coal bought by the bushel of 76 lbs. and on the residuals sold. The coal carbonized was determined by adding the stock on hand at the first of the year to the coal bought, and subtracting the stock at the end of the year. For the thirteen years the difference between that reported used by the foreman and that bought was 4 per cent. The greater part of the difference occurred in the latter years; being due to the stokers not getting the full charge load into the retorts. Weighing the coal from the shed to the retort-house was begun in 1911, a weekly report of the results being made. This worked out very close to the coal bought per annum. The yield of gas given was corrected to 60° Fahr., and 30 inches of the barometer; the illuminating power being taken with a Sugg "D" burner and the standard candle.

GERMAN CAPITAL IN RUSSIAN GAS-WORKS.

[FROM A CORRESPONDENT.]

Amid all the military turmoil that obtains in Russia just now, the political economists of the country are spending a good deal of time in exposing the wonderful economic hegemony of Germany within the Russian frontiers. In many branches of Russian industry the German master hand has been recognized, and is being fully exposed, notwithstanding the able dispositions and combinations with which Germans have for many years exercised business control in Russia without being ostentatiously obtrusive. In the course of a full statement on German predominance in Russian light and power concerns, it is shown that Germany is particularly strong in respect to the Russian gas supply.

The statement made in the "Government Gazette" is substantially as follows: German industrialists are the concessionaries for the construction and exploitation of tramways and electricity works almost everywhere in Russia; and at the same time they have contrived to obtain concessions extending over long periods for gas lighting in the principal Russian towns. Thus Germany has gas-works in Kalics, Petrokoff, Tomasheff, Libau, Kronstadt, Wilna, Kazan, Warsaw, and Petrograd. The German Continental Gas Company are the largest existing gas concern in Russia. As a matter of fact, besides gas-works, the Company possess chemical works in which are produced sal ammoniac spirit, anhydrous ammonia, naphthalene, benzol, carbolic acid, &c. The influence of the Germans in the Warsaw municipal concerns is even greater when it is remembered that the undertaking of the Warsaw Electric Light Company also belongs to them.

The statement adds that the German gas lighting companies in Russia have been very prosperous of recent years. They have yielded good dividends, as can be seen from the following statement—the figures being the rates per cent.:

Years.	Kazan.	Augsburg.	Haarden.	Continental.
1911	6	9	10½	11
1912	8	9	10	11

The shares of the German Continental Gas Company are quoted on the Berlin Bourse. According to Saling's "Börsenpapiere" for 1914-15, the Company took part in 1914 in the formation of the Odessa Gas Company. There can be no doubt that in other directions not generally suspected the German financier has a strong hold; but the foregoing is evidence enough that he has the lion's share of the Russian coal-gas business.

Dearer Gas at Guildford.—The Guildford Gas Company, owing to the cost of coal and the difficulty of getting an adequate supply, have decided, as from Lady Day, to charge ordinary consumers 3d. and users of prepayment meters 2d. extra per 1000 cubic feet.

Effect of the War at Richmond.—Moving the adoption of the report and balance-sheet at the half-yearly meeting of the Richmond (Surrey) Gas Company, the Chairman, Mr. T. J. Carless, said that the extra cost of coal and lower prices for residuals were responsible for a seriously decreased profit. The difference in the two items, as compared with the corresponding period of the previous year, was equal to about 7d. per 1000 cubic feet of gas sold. Accordingly, the price of gas was increased by 2d. per 1000 cubic feet last autumn, though an increase of 6d. was justified; and he was afraid that present coal prices pointed this way. They had some forty men serving with the Colours; and the Company were paying between £700 and £800 per annum to the support of their families and dependants. In addition to this, the Board had decided to pay their men a war bonus, varying from 2s. to 3s. a week, according to the amount of wages paid. This would involve an extra expenditure of close upon £1000 a year. The report was adopted; and a dividend of 5¼ per cent. was declared.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

The "Total-Heat" Calorimeter.

SIR,—I have read Mr. Simmance's letter in the current issue of the "JOURNAL," and fail to see any point in his criticism of my experiments with the "Boys" and "Total-Heat" calorimeters.

My object in making comparative tests with the two calorimeters was simply to see how they compared, and to ascertain the justification for the statement that "the 'Total-Heat' calorimeter is to other calorimeters what the No. 2 argand burner is to other argand test burners."

I find that the "Boys" calorimeter invariably gives the higher result, and therefore, to quote Mr. Simmance's own words: "The fact is that the calorimeter which gives the higher result must be nearer the 'Total Heat' than one yielding a lower result."

According to my experiments, which have been carried out with the utmost care, the "Boys" instrument is the one which has the greater claim of the two to the designation "Total-Heat" calorimeter. When Mr. Simmance can supply me with an instrument which gives a better results than the "Boys," I shall be the first to acknowledge it.

I think the majority of gas engineers are agreed that if the fullest economical advantage is to be taken of new methods of carbonizing, they must produce gas of a maximum calorific power of 550 to 560 B.Th.U. with a low incombustible content. If these results are consistently maintained, the illuminating power can be practically ignored.

Mr. Simmance quotes the average of the tests of London gas for the year 1914, which he states "give us some idea as to the relationship between calorific power and illuminating power."

Against these figures I quote the result of some recent experiments I have made, as to the effect on candle power and calorific power when producing 13,500 to 14,000 cubic feet of gas per ton of coal in continuous vertical retorts. They are as follows:—

Illuminating Power. Candles.	Calorific Value. Calories.	Calorific Value. B.Th.U.	B.Th.U. Per Candle.	Nitrogen. Per Cent.
12·8	141·3	560·9	43·8	3·31

24-hour samples

Comparing these figures with those quoted by Mr. Simmance, it will be seen that illuminating power and calorific power have a very indefinite relationship.

I have not found a means of increasing the illuminating power of gas at the expense of its calorific power; but, what is of more importance, there is a system of carbonizing available to every gas engineer whereby he can largely increase his yield of gas per ton of coal carbonized, and at the same time maintain the required calorific power, and constant composition.

We are indebted to Mr. Simmance for his work on the "Total-Heat" calorimeter, and hope he will continue his experiments, so as to place this instrument in the same position in reference to calorimetry as the No. 2 "Metropolitan" argand burner is to photometry.

Manchester, March 12, 1915. J. G. NEWBIGGING.

"Silly Theory" on Gas-Fire Heating.

SIR,—I have read with interest your courteous criticism of my paper on "Electric Heating" [*ante*, p. 502], and note that your contributor claims an 80 per cent. efficiency with a gas-fire. If he had read further through my paper, he would have discovered the results of tests which agree very closely with my estimated efficiency of 27 per cent. This being the case, I should like to ask him where the other 53 per cent. went to—if it did not go up the chimney?

Based on an 80 per cent. efficiency, a consumption of 8 cubic feet of gas per hour should comfortably warm a room of 1600 cubic feet.

I am afraid if the memorandist warmed his house with gas-fires based on this efficiency, even *his* enthusiasm for gas would not keep him warm through the winter.

R. WEAVING.

Manchester, March 12, 1915.

[Mr. Weaving has given us a poser. Where did a certain 53 per cent. of heat vanish to—if it did not go up the chimney? There is about as much sense in asking us this question, as in putting the inquiry, "Where was Moses when the light went out?" We have no more notion as to where the 53 per cent. of heat went to than we have as to the geographical situation of Moses at an awkward moment. This we do know, that, given a modern gas-fire and normal chimney, the amount of heat did not flow away up the latter. As to the alleged efficiency of 27 per cent, we have nothing to vouch for its accuracy. What was the type of fire used? What were the conditions under which the tests were made? Were the tests made by the radiometer-*cum*-thermopile method, with all the elaborate test-instruments to ensure absolute accuracy—such as have been set up in the Fuel Department at Leeds University, and at several laboratories in the country where gas-fire productions are constantly under test? We are given nothing by Mr. Weaving to show us that his 27 per cent. efficiency is right. He ridicules the efficiency of 80 per cent. We ask Mr. Weaving to take only two of several highly qualified experimenters whose work has given to gas fires a radiant efficiency of approximately 50 per cent., with about 25 per cent. of convected heat.—Dr. W. A. Bone, F.R.S., and Mr. W. J. Atkinson Butterfield, M.A., F.I.C. Will he tell us what he has to say against the competence of these two scientists for making gas-fire tests? Then we ask Mr. Weaving what objection he has to advance against the conditions and instruments employed by these two scientific explorers in making their investigation? If he applies at the gas offices at Manchester, we have no doubt Mr. Newbigging will be pleased to allow him to examine all the reports of the Gas-Heating Research Committee upon the tests carried out at the Leeds University (say, from 1908 9 onwards) under Dr. Bone's supervision. These reports will be found in the "Transactions of the Institution of Gas Engineers" for the years named. The conditions under which Mr. Butterfield's tests were made were described in the "JOURNAL" for July 22, 1913 (p. 232). Will Mr. Weaving also consult that issue, and tell us what he has to say against the tests, instruments, and results there described by Mr. Butterfield. Let us give an example of the results:

Distribution of the Heat per Cubic Foot of Gas Consumed.
(No Elbow or Flue-Pipe.)

	"Apollo" Fire. B.Th.U.	"Apollo" Fire. Per Cent.	"Mascot" Fire. B.Th.U.	"Mascot" Fire. Per Cent.
Radiation measured	231·5	43·24	229·6	42·90
Flue-gas losses determined	126·5	23·63	143·3	26·78
Convection, conduction, unmeasured radiation, &c. (by difference)	177·5	33·13	162·1	30·32
Net calorific power of gas.	535·5	100·00	535·0	100·00
Proportion of heat of gas rendered available for heating the room (total heat less flue-gas losses)	409·0	76·37	391·7	73·22

Mr. Weaving will mark the percentage figures in the bottom line. And these are figures obtained with the use of a radiometer passing a proportion of radiant heat at top and sides! We await Mr. Weaving's criticism of men, instruments, methods, and results. Much more of the same kind can be supplied if he requires it. When our correspondent is replying, perhaps he will tell us wherein the tests that gave him 27 per cent. efficiency differed in the matter of instruments and methods—and, may we add, competence on the part of the observer?—from those at Leeds and as described by Mr. Butterfield. We are anxious to answer, if it is at all possible, the question put to us.—ED. J.G.L.]

The Referees' New Notification—A Correction.

SIR,—A printed slip, worded as attached, will be issued from this office in the course of a day or two; but possibly it would be useful to some of your readers if you would insert a note of the correction to which it refers in the next number of the "JOURNAL."

W. J. A. BUTTERFIELD,
Secretary to the Gas Referees.

66, *Victoria Street, S.W., March* 13, 1915.

[ENCLOSURE.]

NOTIFICATION OF THE GAS REFEREES FOR THE YEAR 1915.

CORRECTION.

On line 18, page 10, read 0·00022 in place of 0·0022. [The figure is correctly printed in the example on page 39]

Science v. Superstition.

SIR,—In reference to the recent discussion, *re* Science *v.* Superstition, and the improved burning of damped coke, may I point out an interesting fact?

Moisture is necessary to combustion, as may be proved by the failure of perfectly dry carbon monoxide to burn in perfectly dry air. Pure carbon monoxide, generated from formic acid, and dried over phosphorus pentoxide, burns perfectly in air containing water vapour; but when the flame is introduced into a large bottle, which has had a little concentrated H_2SO_4 shaken up in it to dry the air, the flame is at once extinguihsed. With a fuel containing hydrogen, the water formed by combustion provides the moisture. Water vapour thus acts as a catalytic agent in promoting combustion, which will not take place unless it is present. Therefore it is possible that in the case of very dry coke (containing little or no volatile matter) burning on a very dry day, combustion may be improved by a judicious damping, which would indeed be necessary assuming that both coke and air were absolutely dry.

"CHEMICUS."

March 12, 1915.

Lichfield Gas Company.—At the annual general meeting of this Company last Tuesday, the Chairman (Alderman H. M. Morgan) read a statement setting forth the causes of the reduced revenue, which were principally the continued increase in the cost of coal and the residuals market being in such an uncertain state during the greater part of the year, especially in regard to sulphate of ammonia and coke. This was the first time for many years that the usual dividends could not be paid. The Chairman proposed a vote of thanks to the Manager (Mr. F. Key) and his staff for the very efficient manner in which the business had been carried on as usual, especially during the past winter, under most difficult and anxious conditions, caused by the shortage of labour—10 of the Company's employees out of a total of 26 having left for military service. In addition to their men, the Manager's only son had joined the Colours. Mr. Key, in expressing his thanks for himself and the staff, said the past year had been the most difficult one experienced out of the sixteen years he had served the Company; but he hoped that when another annual meeting came round, the position would have improved.

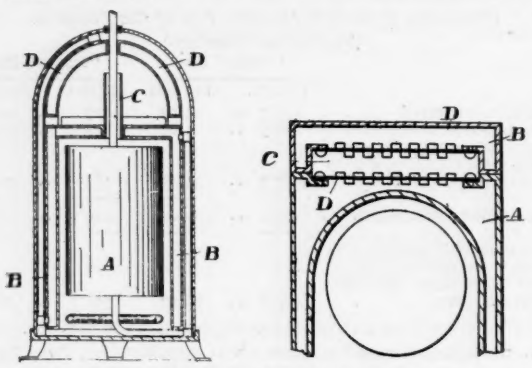
REGISTER OF PATENTS.

Gas-Heated Hot-Water Circulators.

STIMSON, E. F., of Upper Tooting, S.W.

No. 26,331 and 26,332; Nov. 17, 1913.

The former invention refers more particularly to circulators wherein the return water, prior to reaching the boiler, passes through one or more jackets around which the products of combustion partially circulate prior to escaping to the main outlet flue; "so that heat, which would otherwise be lost, is absorbed by, and raises the temperature of, the boiler feed water."



Stimson's Gas-Heated Hot-Water Circulator.

As shown on the left-hand side, a boiler A (preferably of the type described in patents No. 29,011 of 1911 and No. 52 of 1912) is vertically mounted, approximately centrally, within a more or less concentric water-jacket, open at its base but formed with an opening in its top from which upwardly projects a short flue C into the interior of a second, dome-shaped, water-jacket D, resting upon the upper part of the jacket B by means of a number of supports, so that openings are formed between the two jackets.

In operation, the products of combustion from a ring burner within the open base of the jacket B pass upwards around the boiler and internal wall of the jacket, and out through opening whence the flue C throws them to the top of the internal surface of the jacket D, down which they circulate and pass out to the space between the jackets and the casing. After circulating around the outer walls of the jackets, they pass to a main outlet flue taken off the casing at any convenient point.

The object of the second invention is to modify the construction of the water-jackets "so as to afford a higher degree of efficiency than heretofore and at the same time render the interiors of the jackets more accessible for the purposes of cleaning when required, and to furthermore prevent the fouling of flues by the accumulation of rust and other deposits."

To this end, instead of forming each jacket with a detachable cover of heavy construction, each jacket has walls of as large an area as practicable, over which products of combustion pass—viz., of comparatively thin plates of copper, copper alloy, or other metal having a high degree of heat conductivity—the plates being secured in position, with radiation lugs, ribs, or the like upon both surfaces.

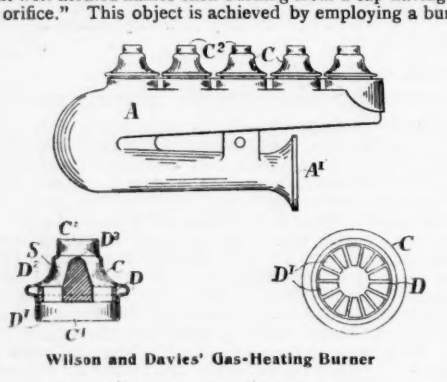
In the right-hand illustration a partial cross section of the circulator is given. The lower jacket A has an upper jacket B mounted on it, and so shaped as to form a flue-passage C. The upper wall of the jacket A and the lower wall of the jacket B are each furnished with a detachable plate D fitted with radiation lugs and secured watertight in position by screws.

Burners Producing a Silent Well-Aerated Flame.

WILSON, W. A., and DAVIES, H., of Armley, Leeds.

No. 1086; Jan. 15, 1914.

This invention relates to "burners and caps therefor for the combustion of mixtures of gaseous or vaporous fuel with air;" the object being "to arrange and construct a burner for the production of one or more silent well aerated flames each burning from a cap having an unrestricted orifice." This object is achieved by employing a bunsen or



Wilson and Davies' Gas-Heating Burner

mixing tube terminating in one or more orifices of comparatively large cross sectional area into or on to each of which is fitted a cap of special configuration and provided with an internal device as shown.

In the mixing tube A (having no tortuous passages, but with an intake A^1 which will permit of the introduction of a large volume of air) are formed one or more orifices of comparatively large cross sectional area on to or into which the cap C, which forms the burner nozzle, is placed. This cap is characterized by a large inlet orifice C^1 and a smaller outlet orifice C^2; while the sides of the cap are so formed as not to obstruct the freeway through an internal device D for producing a silent flame.

A preferred form of cap adapted to be used more particularly for the combustion of mixtures of coal gas and air is constructed as follows—the dimensions given being those suitable for the combination of quantities of gas and the necessary air up to 5 cubic feet of gas per hour in the form of an upright flame. The cap, externally, is cone-shaped, dome-shaped, or a combination of both forms, or otherwise, so long as there is present the combination of two orifices C^1 and C^2 of greatly differing cross-sectional area. The lower orifice is the larger; and the configuration of the cap, combined with the device D, is such that the apertures D^1 of the device are not obstructed by the cap walls, and the area of freeway available for the mixture of gas and air is not reduced, throttled, or obstructed by such configuration.

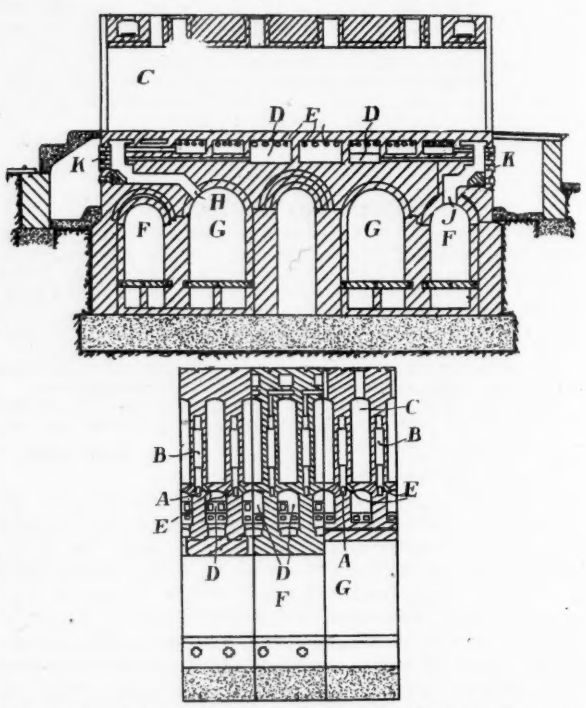
The lower or larger portion of the cap or inlet C^1 for the quantities mentioned may be circular and 1 inch in diameter. In such case the upper orifice C^2 will be approximately $\frac{3}{8}$ inch diameter. Inside the cap is fitted a device D for producing the "silent well-aerated flame." The device may take various forms so long as it comprises a disc or discs having passages therethrough and a central extension extending towards the outlet; but in all cases it must be arranged in the cap that, although the gaseous mixture flowing up the cap is not unduly checked—as would be the case with known diaphragms perforated on their edges, or with hollow caps similarly perforated, which tend to set-up back-pressure, and so prevent good aeration—the quick outflow of the mixture from the centre of the unrestricted orifice C^2 is hindered and an even flow from over the whole orifice occurs, and thus, when ignited, a silent flame is produced.

Gas-Fired Coke-Ovens.

SIMON-CARVÈS BYE-PRODUCT COKE-OVEN CONSTRUCTION AND WORKING COMPANY, LIMITED, and BROWN, J. H., of Manchester.

No. 29,367; Dec. 20, 1913.

This invention relates to coke-ovens having air and gas chambers disposed along the front or back and air and gas passages leading from them to the combustion chambers between the coking chambers—such passages being separately controlled from the outside, as described in patent No. 14,281 of 1906. The invention consists in so constructing, controlling, and operating the coke-ovens that they may be heated either by a rich gas or a poor gas; or, alternatively, the rich and poor gas may be concurrently employed in varying proportions.



Simon-Carvès Company and J. H. Brown's Gas-Fired Coke-Ovens.

A vertical longitudinal section along one of the coking chambers is shown; also, various transverse sections.

A indicates channels by which rich gas is conveyed to the vertical combustion flues B between the coking chambers C. Below C are ducts or chambers D, each of which opens by channels E to the combustion flues at each side of it. F and G are regenerators. H and J are flues leading from the regenerators to the ducts or chambers D. Each of the passages by which air or gas is thus fed to the ducts has its flow capacity controlled by fire-clay plugs put in place into, or removed from, the channels through closable openings K in the walls of the oven, as described in the 1906 patent. Through like openings fire-clay blocks may be manipulated to choke or close the passages leading from the air and gas regenerators G and F.

When the ovens are to be started, gas from a rich-gas main is led to

the channels A, and thence to the combustion flues B. The air necessary for combustion of this gas is supplied to the flues from the ducts D and channels E through one set of regenerators F or G. Each chamber D supplies the combustion flues on each side of it. The products of combustion pass away through the other regenerators F or G, as usual.

When the ovens are sufficiently heated and inferior gas may be employed, the supply of rich gas is cut off and the supply of air to the regenerator F is discontinued, and the regenerator supplied with blast furnace or other poor gas instead. The regenerator F therefore now supplies with poor gas the ducts or chambers D it previously supplied with air. The regenerator G continues to be supplied with air and continues to supply air to its connected ducts D. The communications between the regenerator [gas inlet] F and the connected ducts or chambers D, and between the regenerator [air inlet] G and its connected ducts or chambers D are such that—in the described condition of working—the ducts or chambers D under the sole of one coking chamber are supplied with air, while the like ducts under the sole of the next coking chamber are supplied with gas. Thus the combustion flues B are supplied with poor gas from the ducts D on one side of them and with air necessary for its combustion from the ducts D on the other side of them.

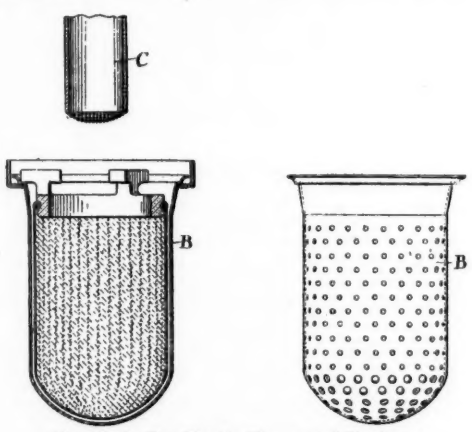
Incandescent Mantle Manufacture.

KNOEDLER, E. L., of Gloucester City, New Jersey, U.S.A.

No. 4120; Feb. 17, 1914. Convention date Feb. 20, 1913.

This invention relates to the shaping and hardening of incandescent gas-mantles—work heretofore done in the open air—the mantle not being enclosed or effectually protected.

The patentee says: "I have discovered that I can shape or pattern a mantle and harden it within a surrounding perforated shaping or muffle mould, provided the perforations are so proportioned and arranged, and the mould so shaped, that while a restricted escape of the products of combustion is allowed, yet a cushion of hot gases is maintained between the mantle and the shaping mould of a substantially uniform thickness or depth between the mantle and the wall of the mould—at least, as to those portions of the mantle which it is desired to make to a pattern or predetermined shape. In obtaining this desirable result, not only is the shape of the mould important, but the size, number, and arrangement of the gas outlet holes must be carefully adjusted so that the intermediate cushion of hot gases will give the desired shape to the mantle while holding it away from actual contact with the wall of the muffle mould. I have found that actual contact between any part of the mantle and the mould must be prevented, since any such portion will not be hardened during the operation, as desired."



Knoedler's Gas-Mantle Shaper and Hardener.

The mould shown may be made either of refractory metal (such as platinum) or of refractory ceramic material, or other composition which will withstand the heat. In the form shown, there are 264 holes in the sides of the mould, each having a diameter of 0·059 inch. There are 94 holes in the dome-shaped end or base of the mould, having a diameter of 0·086 inch. The total area of holes is in this form approximately 24 per cent. of the total area of the mould, distributed at about 13 per cent. in the walls and 11 per cent. in the bottom or dome. The arrangement, number, and size of the holes depends somewhat upon the pressure and type of burner used; and with the mould shown an air pressure of 2 1 lbs. and a gas pressure of 3 inches of water with a burner having an orifice $\frac{19}{32}$ of an inch gives good results—effectually hardening mantles to a pattern within the mould B by means of the burner C, which does not enter the mould or mantle, but is spaced slightly apart from it, as shown. The open mouth portion of the mould is preferably flared outwardly and provided with a centring shoulder having an interior diameter corresponding to the outer diameter of the legs of the refractory ring to which the mantle is secured. The mixing-tube of the burner preferably has an axis registering with the longitudinal axis of the mantle and mould, and projects a flame giving a high degree of heat—1200° or 1300° Fahr.—in hardening.

The essential feature of the invention consists in hardening the mantle and simultaneously shaping it against the action of a thin cushion of hot gases between the article and the walls of the shaping cavity—sufficient escape for the gases being provided to give a restricted outlet and prevent such a back-pressure as would distort the mantle, while, at the same time, maintaining the shallow cushion.

The sizes and arrangement of perforations may be departed from provided the cushion of hot gases is maintained of the character described, also that the shape of the muffle may be changed (it may have both ends open), and that various other changes may be made without departing from the invention, since, the patentee remarks: "I consider myself to be the first to successfully harden and shape a mantle within a shaping cavity or muffle."

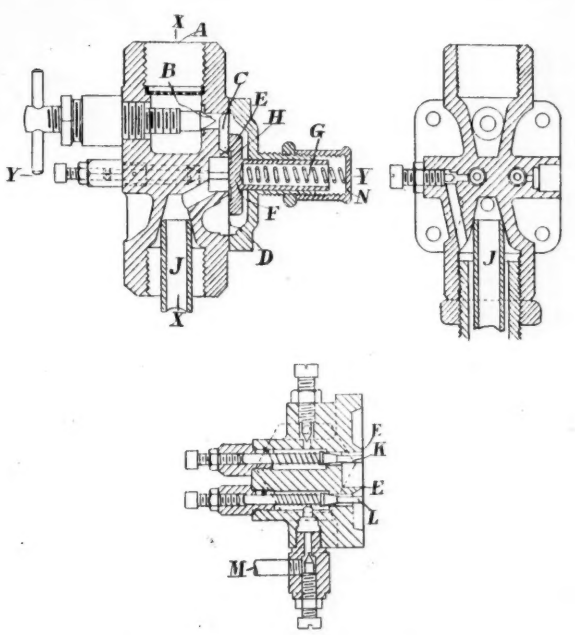
Automatically Lighting and Extinguishing High-Pressure Gas-Lamps.

KEITH, J. & G., of Farringdon Avenue, E.C.

No. 4290; Feb. 19, 1914.

This invention relates to apparatus for automatically lighting and extinguishing gas-lamps from a distance by variations in the pressure of the gas supply,

In previous apparatus of this type—see patent No. 2414 of 1913—the supply to the burner is (the patentees remark) cut off under low pressure by a diaphragm which acts both as a valve and a piston, and on the back of which is arranged a second valve for controlling the bye-pass; so that, when the main valve is closed, the bye-pass is fully open, and *vice versâ*—there being an intermediate position which permits of a flash being given to the bye-pass at the instant of lighting. In connection with the most modern types of high-pressure incandescent gas-lamps—see patent No. 1348 of 1912—it has been found necessary to enrich the mixture contained in the heater for the combustible mixture at the moment the lamp is extinguished, in order to prevent the contents of the heater from exploding and destroying the mantle. While this enrichment of the mixture is more or less readily effected in the case of a lamp controlled by a cock having a special port which is only opened during a portion of the angular movement of the cock, it is believed that the apparatus now to be described is the "first automatic lighting and extinguishing apparatus which also provides not only for producing a flash at the bye-pass but also takes care of the introduction of a separate auxiliary supply of gas direct to the gas and air heater at the moment of lighting or extinguishing—the consequent enrichment of the mixture being effected only when the main valve is off its seat."



Keith's High-Pressure Lamp-Lighter.

A vertical section of one embodiment of the invention, a section on the line X, and a section on the line Y are given.

From the inlet A the gas flows, by a passage controlled by a valve B, to an annular chamber C at the inner side of a flexible (preferably metallic) diaphragm D. Disposed concentrically with the diaphragm (preferably coplanar with the inner face of the flange of the diaphragm casing) is an annular valve seat E. Operatively connected to, and located externally of, the diaphragm is a spring-loaded plunger F, having a flanged portion the end face of which (adjacent to the diaphragm) is formed with a recess H opposite the valve seat E and partially entered by the thin metal of the diaphragm, caused to do so by the spring G. When the gaseous pressure within the chamber C is sufficient to overcome the resistance offered by the diaphragm D, the diaphragm is deflected outwardly, and communication is established between the chamber C and the tube J leading to the lamp.

Control of the pilot light bye-pass and of the supply of gas for the enrichment of the mixture is effected through the intermediary of spring-loaded valves K L, the ends of the stems of which are engaged by the diaphragm, rendered rigid near the surface of contact with the seat E by the solid abutment afforded by the end face of the flanged portion of the plunger F.

The valve L, which controls the pilot light bye-pass M, is external to the valve seat E; and the valve K, which controls the supply of enriching gas, is internal to the seat. On the inward deflection of the diaphragm both valves K L are opened by virtue of their engagement with the diaphragm; but communication is only established between the chamber C and the bye-pass M, while the connection between the chamber C and a passage O, leading to a point of the system beyond

the usual injector, is interrupted by the diaphragm pressing against the seat E.

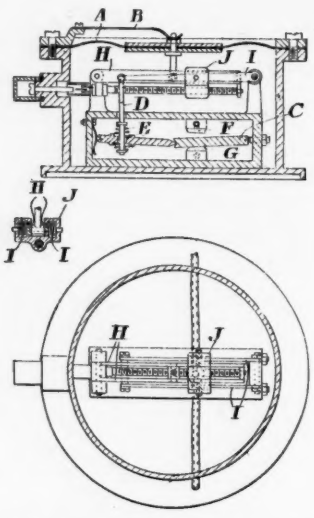
Complete outward deflection of the diaphragm is accompanied by closure of the valves K L—the supply of gas for enrichment of the mixture and for the maintenance of the pilot light being thus interrupted. When the pressure is just sufficient to move the diaphragm off the seat the valve K is open, and a portion of the gas can pass by way of the valve to the selected point of the system beyond the injector—the remainder passing down the tube J. Further increase of pressure within the chamber C results in the release of the diaphragm valve and in the closure of the valve K, whereby the supply of enriching gas is interrupted and the entire supply of gas is passed through the tube J. The critical point at which (on the reduction of gaseous pressure) enrichment commences may be accurately determined by adjusting the load of the spring G by the screw-threaded cap N.

Controlling the Frequency of Automatic Lighting Apparatus.

AKTIEBOLAGET LUX, of Stockholm.

No. 4473; Feb. 20, 1914. Convention date, Feb. 22, 1913.

In apparatus for controlling the frequency of automatic intermittently operated lighting apparatus, it is "important that the periods of light and darkness should be susceptible of being controlled as desired and according to requirements," and also that the quantity of gas supplied at each stroke should be controllable by means operated from the exterior.



Swedish Automatic Lighting Apparatus.

The casing of the apparatus shown is divided by the movable wall or diaphragm A, which is acted upon in one direction by a spring B, and in the other direction by the variable gas pressure, and which, in its turn, actuates a valve plate C by means of reversing mechanism D E, so as to close alternately an inlet F and an outlet G for the gas. There is inserted between the diaphragm and the reversing mechanism two levers H I—the former connected to the diaphragm, while the latter is connected to the link D belonging to the reversing mechanism and to a link J connecting the levers and adapted to be reciprocated along them. By moving this link in either direction by means of a screw rotatable from outside [after the removal of a small cover] and engaging a nut secured to the link, the leverage of the two levers may be increased or diminished, so as to cause a reverse movement of the valve C upon smaller or greater movements of the diaphragm A, and so admitting a smaller or greater quantity of gas for each stroke and a greater or smaller speed of reciprocation.

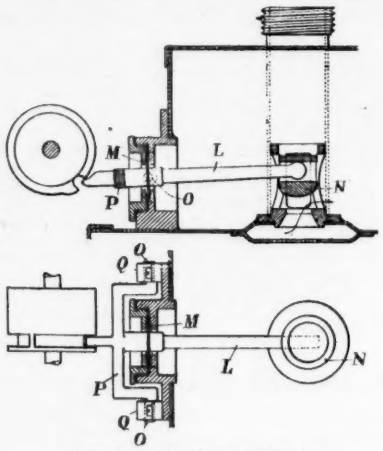
Coin-Operated Meters.

CIE. POUR LA FABRICATION DES COMPTEURS ET MATÉRIEL D'USINES À GAZ, of Paris.

No. 4825; Feb. 24, 1914. Convention date, Feb. 26, 1913.

This invention relates more particularly to the means for transmitting the movement from the external coin-operated mechanism to the internal supply valve of the meter, which is opened when coins are introduced, and closed when the amount of gas paid for is exhausted. The transmitting parts (say the patentees) have obviously to pass through the outer walls of the meter through an orifice which must be provided with a leakage preventing device.

According to the invention, a lever having one end actuated by the external coin-freed mechanism and the other end controlling the internal supply valve, is so fulcrummed that it can rock in one plane to effect the transmission, and extends through an orifice in the meter wall—the orifice being hermetically closed by a flexible membrane to which the lever is hermetically attached at its place of penetration. It has been proposed to use as a motion transmitting device between the inside and the outside of the meter, a flexible membrane closing an orifice in the wall and traversed by a lever hermetically connected to it; the lever being provided with a spherical enlargement (where it traverses the membrane) journalled in bearings in the meter wall, so as to permit oscillatory movements of the lever in any direction.



A French Coin-Operated Meter.

The orifice in the meter wall is closed (as shown) by a flexible circular membrane M hermetically connected at the centre to a transmission lever L, and hermetically gripped along its periphery between two screwed parts fitted in the orifice. The lever is provided with a cross-bar P in the form of a crank, the ends of which form trunnions O rotating in bearings Q secured to the wall in line with a diameter of the membrane. One of the ends of the lever is operated by the coin mechanism, while the other end controls the supply valve N. Thus any lateral movement of the lever except in its normal plane of oscillation is avoided.

A slight rocking movement of the lever, "producing a very small and symmetrical deformation of the membrane," suffices for opening and closing the valve; the "amplitude of the oscillation movement being proportional to the distance separating the valve from the membrane," which can be reduced at will while retaining a considerable valve lift.

As the membrane is therefore not subjected to any appreciable deformation, it offers practically no resistance to the movement of the valve, even when it is necessary to use a membrane of some thickness or stiffness in order to obtain the requisite strength and impermeability. This tight connection leaves unchanged the chambers in which the coin mechanism and the valve operate.

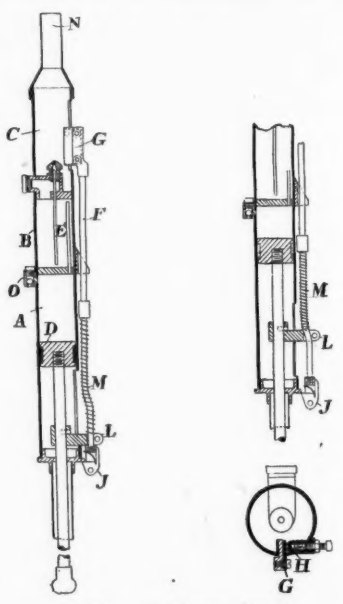
The membrane thus guarantees "hermeticity" in a permanent manner; while the crank crosspiece working in the two bearings Q, ensures a reliable centering and guiding of the lever.

Gas-Lighting Torch.

KEITH, J. & G., of Farringdon Avenue, E.C.

No. 6385; March 13, 1914.

This gas-lighting torch is designed "to avoid the drawbacks associated with the use of a permanent flame, but adapted at the same time to furnish a flame of sufficient length and duration to effect readily the



Keith' as-Lighting Torch.

ignition of the gas at the mantle, even when at a considerable distance from the torch," by "producing at the upper end of the torch, by means of a spray of liquid fuel, a combustible charge and igniting

the charge simultaneously by a spark obtained with the use of pyrophoric substance."

The invention is illustrated in part elevation part vertical section, showing the torch in its out-of-use position; a detail view showing the parts in the position occupied just before the spring-actuated rod is released; and a plan showing the pyrophoric material and serrated member in engagement.

The torch consists of three main parts (preferably in line): The cylinder A, the container B for spirit, and a chamber C in which the combustible or spirit is atomized and ignited. The piston D (movable in the cylinder A), when moved upwards, causes air to be discharged into the container B by way of the tube E, so as to atomize the spirit. Acting parallel with the piston rod is a rod F, carrying at the upper end a file G, which enters the chamber C—passing through a vertical slot in the wall of the latter. H is a piece of pyrophoric alloy, in a horizontal chamber, pressed against the file by a spring and feed screw. The lower end of the rod is fitted with a detent J, which normally engages the lower end of the torch head. The piston rod carries an arm L, which, on the upward motion of the piston, acts to compress a helical spring surrounding the rod F. The compression of the spring increases with the upward motion of the piston D until the arm L engages with a cranked portion of the rod F, when it pushes the rod outwards and releases the detent J from the torch head. The expansion of the spring then carries the rod F upwards; the action of the file G rubbing on the pyrophoric material, causing the production of a spark. As the spark is produced simultaneously with the discharge of spirit in the form of spray into the chamber C, the spray (being sufficiently aërated) is ignited, and a long flame is produced at the outlet N. When the piston D is restored to the initial position, the arm L catches the detent J and draws it down so that it engages with the lower end of the torch head—the device being again ready for use.

APPLICATIONS TO AVOID OR SUSPEND ALIEN ENEMY PATENTS.

1673 of 1908.—Grantee, RIES, "Retort and chamber furnaces." Applicant, S. N. WELLINGTON.

28,027 of 1909.—Grantee, OFENBAU-G.M.B.H., "Apparatus for closing the doors of retorts, &c." Applicant, S. N. WELLINGTON.

9269 of 1912.—Grantee, BERLIN-ANHALTISCHE MASCHINENBAU AKT.-GES., "Apparatus for quenching coke." Applicant, S. N. WELLINGTON.

14,702 of 1912 —Grantee, STETTINER CHAMOTTE-FABRIK AKT.-GES. VORMALS DIDIER, "Regenerative gas-furnace." Applicant, S. N. WELLINGTON.

27,949 of 1912.—Grantee, STETTINER CHAMOTTE-FABRIK AKT.-GES. VORMALS DIDIER, "Discharging vertical coking chambers." Applicant, S. N. WELLINGTON.

23,555 of 1913.—Grantee, BERLIN-ANHALTISCHE MASCHINENBAU AKT.-GES., "Apparatus for quenching coke." Applicant, S. N. WELLINGTON.

APPLICATIONS FOR LETTERS PATENT.

3225.—ASHCROFT, E. A., "Producing toluol, benzene, &c." March 1.

3237.—ELY, B., and ROLLASON, A., "Treatment of waste ammoniacal liquor." March 1.

3267.—RASCH, L., "Burner chimneys." March 1.

3359.—PETERMÖLLER, J., "Gas-burners." March 2.

3373.—AIRD, K., and M'GEACHIN, J., "Gas-fires." March 3.

3458.—JACKS, T., "Gas stoves." March 4.

3460.—WHITELEY, A., "Controlling public lighting." March 4.

3604-5.—JOHN SPENCER, LTD., SPENCER, T. H., and SMALLMAN, H. S., "Pipe and like joints." March 6.

3632.—FIELD, S. S., and SOUTH METROPOLITAN GAS COMPANY, "Recovery of toluene from coal gas." March 6.

Freight Rates to London.—In the House of Commons early last week, Mr. Neville, the Chairman of the Brentford Gas Company, asked the President of the Board of Trade what was the highest freight per ton of coal charged for the use of any of the interned steamers lately made available for the coastal trade; and what was the average freight charged for such interned steamers, as compared with the average freight per ton charged for the use of similar steamers other than those interned. Mr. Runciman, in his reply, said that from the Tyne to London the highest freight paid in the case of an interned steamer was 13s., which was 1s. 6d. to 2s. 6d. below the rates on outside steamers. The present rate on interned steamers was 12s., and on outside steamers 14s. 6d. to 15s. 6d. The average rate to London during February was 13s. 6d. for outside steamers and 10s. 10d. for interned steamers.

Woking District Gas Company.—The report of the Directors of this Company for the half year ended Dec. 31 was noticed in the "JOURNAL" last week. In moving its adoption at the general meeting on the 8th inst., Mr. Samuel Spencer, who presided in the absence of Mr. C. H. Master, the Chairman, said he thought that it must strike the shareholders as being very satisfactory. They were able to show an all-round increase—a money as well as a "make" increase—while they were not overdone in regard to the cost of coal, which he thought must be very gratifying to all concerned. They made 44 million cubic feet of gas during the half year, compared with 41 millions for the corresponding period of 1913 – another exceedingly good result under all the circumstances. Mr. F. J. Bancroft, in supporting the motion, said the chief feature of interest was that Mr. Ely, their Manager, was now getting 12,870 cubic feet of gas for every ton of coal carbonized—an increase of 800 cubic feet per ton. This was really the paramount item which had caused them to make upwards of 3 million cubic feet more gas with only a very slight increase in the price of coal. In conclusion, Mr. Bancroft paid a tribute to Mr. Ely's zeal in furthering the interests of the Company. The report was adopted and the dividends recommended were declared.

PARLIAMENTARY INTELLIGENCE.

ASCOT DISTRICT GAS AND ELECTRICITY BILL.

The War and the Auction Clauses.

Last Wednesday, the Unopposed Bills Committee of the House of Commons—presided over by Mr. WHITLEY—considered the Bill promoted by the Ascot Gas and Electricity Company.

Mr. E. C. COOPER (Messrs. R. W. Cooper and Sons, Parliamentary Agents) said the Bill was of a quite ordinary type, authorizing additional capital; and the Company were taking advantage of the opportunity to include in it certain provisions of a general character to bring the powers under which the Company work up to date. There were, however, three clauses touching the financial scheme of the Bill which the Committee might regard as somewhat contentious. They would require some little argument, and he proposed to put forward some evidence in support of his proposals. The clauses in question were Nos. 4, 5, and 11, which represented the financial proposals of the Bill; and he was inserting a proviso at the end of the auction clause relieving the Company from the obligation to submit capital to auction, in circumstances which he proposed to explain.

The CHAIRMAN: You are also departing from the Model Clause considerably. I do not think the Committee will be inclined to depart from the Model Auction Clause.

Mr. E. MOON, K.C. (Speaker's Counsel): There is also an alteration in the Model Clause in clause 4.

Mr. COOPER said he had considerable evidence to lay before the Committee as to the serious difficulty which the Directors of the Company anticipate, in common with the direction of most statutory undertakings, in raising money on anything like the usual terms, in the exceptional conditions which are likely to exist at the end of the war. There would, without question, be an enormous number of new issues in all countries of the world. At the conclusion of the war what chance would the Company have in such a rush if they had to comply with the auction clauses? First of all, the Directors would have to consider, in the exceedingly difficult and complex condition of things which would obtain, what would be a reasonable reserve price—what the investor would consider reasonable. Then they had to give 28 days' notice, and then make the necessary arrangements for the sale. When the stock was offered, they would probably find, as directors of companies had found but too frequently lately, that they had not accurately forecasted the position and fixed what the investor thought to be a reasonable reserve price. He wished to bring evidence to show that the number of failures of recent issues, even in existing conditions, when the directors ought to be better able to judge what was a reasonable reserve, was due to the utter failure to fix such a price as would tempt the investor. Consequently, the directors had to take their proposal back and consider what next to do. Under the auction clauses they could offer it to the shareholders; but the latter would say—and he could bring evidence on the point—"Thank you, we have had an opportunity of buying in the auction-room, but we don't care to take capital refused at auction; we don't want it." The Directors would have spoiled their market, and yet they had to raise capital. He assured the Committee he was not exaggerating. Since the commencement of the war it had been a most difficult thing for the directors of companies adequately to fix a reserve; and the serious part of it was that, having failed to accurately gauge the proper reserve, the effect was that the stock had to be sold eventually at a very low price.

The CHAIRMAN: These auction clauses have been fixed with many considerations in mind; and it is a serious thing to ask the Committee, on a Bill of this kind, to depart from a well-considered scheme of clauses.

Mr. COOPER: Why a Bill of this kind? I am asking for additional capital in totally exceptional circumstances.

Mr. MOON: There are many other Bills of this kind, and these clauses are not asked.

Mr. COOPER asked why should he be refused them because other promoters had not had the forethought to ask Parliament to give them provisions to cope with the difficulties which his Directors believed would arise.

Mr. MOON said it rather showed that the gas profession did not feel the necessity of them.

Mr. COOPER replied that he could quite understand that, when the Bills were framed in October or November, many of them at Westminster had not thought of throwing their minds so far ahead as to consider what would happen in 1915 or 1916. The Directors of the Ascot Gas Company, however, did do so.

Mr. MOON: I do not think we can foreshadow what will be the condition of things in 1916.

Mr. M'LEAN (a Member of the Committee) said it seemed to him that the Committee were being asked to depart from an established precedent on a hypothetical case. Nobody knew what the position of the Money Market would be at the end of the war.

Mr. COOPER said he would not presume to argue against Mr. M'Lean on such a matter, but he thought it might be agreed that one or two things were likely to occur. There would be an enormous number of applications for capital from all parts of the world. If this were so, the next thing to consider was whether those who were asking investors for money would not have to make their terms very attractive.

The CHAIRMAN: The shrewdness of your Directors, which we do not doubt, will go as far as to enable them to fix a proper reserve price when they do offer their stock by auction.

Mr. COOPER said he would not like to impugn the shrewdness of those directors who had failed during the last few months. They had failed, nevertheless, very seriously.

After consultation,

The CHAIRMAN said: I am afraid we cannot depart from the Model Clause. We must ask you to put this in the model form. There are some other points besides the proviso.

Mr. COOPER said he did not wish to question the decision. He

pointed out, however, that the Model Clause was not a Standing Order requirement.

The CHAIRMAN agreed, but said that it was a clause which the Lord Chairman and himself had considered very carefully, and it had been the standard for some time.

Mr. MOON remarked that the Committee were bound to put in the auction clause unless they gave good reasons for not doing so.

The CHAIRMAN: I think you may take it you must conform. We are not prepared to make the departure at present.

Mr. MOON: That will apply to clauses 4 and 5.

The CHAIRMAN said there were some minor points of drafting in which Mr. Cooper had tried to improve on the Model Clause. The decision given must be considered broadly.

Mr. COOPER: In which clauses?

Mr. MOON: In clauses 4 and 5. There are four lines inserted at the end of clause 4; but I do not know the object of them.

Mr. COOPER said it was to cover the case of a premium being realized.

Mr. MOON replied that a premium was realized in every case, and he did not see the object of the words.

It was agreed to settle these drafting questions between Mr. Cooper and Mr. Moon privately.

Clauses 4 and 5 as originally in the Bill read as follows:

CLAUSE 4—POWER TO COMPANY TO RAISE ADDITIONAL CAPITAL.

The Company may from time to time raise additional capital not exceeding in the whole £35,000 by the creation and issue of new ordinary shares or stock or new preference shares or stock, or wholly or partially by one or more of these modes respectively, but the Company shall not issue any share of less nominal value than £10, nor shall any such share or stock vest in the person or corporation accepting the same unless and until the full nominal amount of such share or stock, together with any premium obtained upon the sale thereof, shall have been paid in respect thereof: Provided that it shall not be lawful for the Company to create and issue under the powers of this Act any greater nominal amount of capital than shall be sufficient to produce, including any premium which may be obtained on the sale thereof, the sum of £35,000.

CLAUSE 5—NEW SHARES TO BE SOLD BY AUCTION OR TENDER.

This is the ordinary auction clause with the following proviso:

Provided that the foregoing provisions of this section shall not apply during the period of five years from the date of the passing of this Act, or within such longer period as the Board of Trade may by order in writing sanction, which said sanction the Board of Trade are hereby empowered to give, and the Directors may, during such period as aforesaid, or such extended period as regards any capital required for the purposes of the undertaking during such period, create and issue such capital at such price and on such terms and conditions as they may think fit.

Mr. COOPER then dealt with clause 11, which was as follows:

The Company may, subject to the provisions of this Act, borrow on mortgage of the undertaking such sum or sums as the Directors of the Company may think fit: Provided that the total amount so borrowed shall not, together with the sums borrowed or which may be borrowed under the provisions of the recited Acts, exceed in the aggregate the sum of £75,000; but no sum shall be borrowed by the Company in excess of an amount equal to three-fifths of the paid-up capital of the Company for the time being: Provided also that no sum shall be borrowed in respect of any capital raised by the Company until the Company has proved to a Justice of the Peace before he gives his certificate under the fortieth section of the Companies Clauses Consolidation Act, 1845, that the whole of the stock or shares in such capital, together with the premium (if any) realized on the sale thereof, have been fully paid up.

Mr. COOPER explained to the Committee that, instead of the usual one-third borrowing powers—*i.e.*, £60,000 new capital and £20,000 borrowing powers—he proposed, having regard to the exceptional circumstances, to make a greater use of the credit of the Company. He apprehended that the ordinary capital would have to be placed at 7 per cent. or even more; and therefore the Committee were asked to allow the Company to borrow three-fifths of the paid-up capital. His justification for this was that the borrower did not concern himself at all as to the relation between the borrowed capital and the paid-up capital. He borrowed on the strength of the balance-sheet; and if he saw that the interest on the proposed debentures was covered by the profit-earning capacity of the Company, he would take 5 per cent. debentures. No harm would be done to the investing public by the proposal. Shareholders obtained no hidden benefit out of it; it was the consumer who got the benefit. In this particular case, the present debenture interest was covered five times over by the earning power of the Company. He had seen the Lord Chairman about this. He did not know whether he had misinterpreted the Lord Chairman's views; but he certainly came away thinking he would meet with no difficulty. He had seen the Lord Chairman's Bill, and there were no comments either on this clause or the auction clauses. Debentures had been sold privately within the last month, at the rate of 4½ per cent., at 90. Last year the Company paid 5½ per cent. dividend, and had paid 6 per cent. for two or three years.

The CHAIRMAN: Why have you fixed the figure of two-thirds?

Mr. COOPER said he would have preferred not to have any relation to the ordinary paid-up capital at all, to be logical, but to limit the amount, if it could be done, by some reference to the average profits of the last seven periods. There were difficulties, however. Another reason was that he did not wish to depart altogether from the stereotyped form of borrowing clause. He felt that there was no sacredness about the two-thirds; and when one inquired into the question, it was somewhat surprising that it should be necessary to put such a condition upon an existing undertaking. With a new company he agreed there should be some restriction, because it had no balance-sheet; but in the case of companies whose balance-sheets were published to the world, and which could hide nothing, there seemed no rhyme or reason in fixing the borrowed money in relation to the paid-up capital. An ordinary investor never saw the company's Acts, and did not know the relation. The effect of the provision now proposed was that he could place 5 per cent. debentures in a number of places where he could not place 7 per cent. ordinary capital, and that was why he had been so modest in his additional capital. If the Committee did not see their way to give the increased borrowing power, he would ask permission to alter the additional capital in clause 4, so that he could revert to what would have been the ordinary lines on which the Bill would have been drafted. He hoped, however, there would be no necessity for this.

The CHAIRMAN said the object of Parliament in limiting the proportion of debentures to ordinary capital was to keep gas debentures of statutory authorities as a high-class security; and the Committee must be careful not to detract from this intention. He quite saw Mr. Cooper's point, that an undertaking which had proved itself could well stand a larger proportion as a commercial matter. The Committee, however, did not like the figure of three-fifths; and if they were to depart from the precedent, it was thought that one-half was as far as they ought to go. He was ready to give this, particularly in view of what Mr. Cooper had said as to the present position of the Money Market.

Mr. COOPER said this would involve an alteration of the £35,000 in clause 4.

Mr. *W. A. Schultz*, the Secretary to the Company, spoke as to the need of the £80,000 additional financial powers granted by the Bill—an amount which he thought would carry the Company on for 12 or 15 years. They were last before Parliament for gas capital in 1906; and the whole of the money then authorized had been spent—indeed, there was an overdraft of £3950. The new capital now asked for was for both electricity and gas. During the past 15 years, the output of the works had been doubled.

The Bill was then ordered to be reported for third reading.

DONCASTER CORPORATION BILL.

This Omnibus Bill, two of the sections of which deal with gas and water, was before the Local Legislation Committee of the House of Commons last Wednesday.

Mr. VESEY KNOX, K.C., and Mr. F. N. KEEN appeared for the Corporation. There were no opponents.

Mr. VESEY KNOX said that the gas undertaking of the Corporation had a rather curious history. It was started at first as a Company, in which the Corporation took half the shares, in 1827. In 1858 the Corporation took over all the shares; but the undertaking was continued by the Company on behalf of the Corporation. In 1894 the business was transferred completely to the Corporation, and statutory powers obtained. Since 1904 the undertaking had developed very greatly, and the sale of gas was now 362 million cubic feet; the capital expenditure being the very low one of £200 per million—much less than it would cost to start such an undertaking to-day. Gas was now supplied at 2s. 2d., without meter-rent, to ordinary consumers and 2s. 5d. to slot consumers—this latter being, he believed, almost the lowest in the country. The Corporation had always followed the policy of paying for services out of revenue. There were a great many cookers connected to the mains. The ordinary consumers had increased from 4638 in 1913 to 5255 in 1914; while the slot consumers had increased from 2841 to 8647. The Bill proposed to extend the limits of supply to include the parishes of Barnby-Dun, Cadeby, High Melton, and Edlington—all in the rural district of Doncaster. The position with regard to Edlington was that a company was formed to erect houses, and an agreement was entered into a few years ago by which the Corporation supplied the Company with water and gas. The agreement had now expired; the water supply being taken over by the Rural District Council, and the Corporation supplying the gas without statutory powers. At present the price charged was 2s. 9d. per 1000 cubic feet; but the prices would be reduced to the same as those in other parts of Doncaster if the extension was granted.

Mr. *Robert Watson*, the Gas Engineer and Manager to the Corporation, said that there were 912 cookers installed in 1903; but the number had increased to 3345 last year. These figures, however, were not strictly accurate, because some cookers had been purchased by consumers in addition. Similarly in the same period the mileage of mains had increased from 35·2 to 63·3. The percentage increases in the output during the last few years had been as follows: 1909-10, 5·61; 1910-11, 6·56; 1911-12, 10·5; 1912-13, 9·23; and 1913-14, 11·10. The Corporation had a sulphate of ammonia plant, the production from which was 240 tons per annum. The present capacity of the plant was two million cubic feet of gas per day. This only allowed a margin of 10 per cent. over the maximum day's output last winter, which was 1,560,000 cubic feet. The capacity of the gasholders was 1,600,000 cubic feet. So much of the capital expenditure on the plant had been paid for that the outstanding balance amounted to only £73,900. Between 1903 and 1914 items totalling £9689, which would ordinarily be paid out of capital, had been met out of revenue. Services were also paid out of revenue, although in some undertakings they were charged to capital. The working capital of the undertaking was also provided from revenue. The undertaking had contributed considerable sums for the relief of the rates, and since 1904 the amount had been (roughly) £7000 per annum. With regard to Edlington, the Corporation already supplied 414 consumers there. The estimated capital expenditure upon new plant for the general development of the undertaking was as follows: Buildings and permanent works, £3565; works for the manufacture and purification of gas, £19,290 (this includes the provision of carburetted water-gas plant amounting to £13,540); works for the handling and treatment of residuals, £2850, including £1300 on coke handling plant and conveyor; mains, £24,930; meters, £10,565; public lamps, £1775—making a total of £62,975. This he anticipated would carry the undertaking on for another seven years. The total amount asked for in the Bill was £65,000, including land.

Mr. KNIGHT (Local Government Board) reminded witness that the Corporation already owned the land, and had paid for it.

Mr. VESEY KNOX said that he thought it would not be necessary to include the cost of the land in the present estimate.

Mr. KNIGHT, who dealt with the question of the loan periods, said that the undertaking had not been provided out of capital but had been built-up out of revenue.

The CHAIRMAN said that the past history of the undertaking made the Committee anxious to follow the extremely creditable course which the Corporation had followed in the past; and in order to help in this direction, they desired to limit the capital as far as possible.

Mr. KEEN said that the development in the new areas would make demands upon the capital.

Mr. KNIGHT said he was not asking for any restriction in the amount of the loan. He merely suggested separate borrowing powers for slot meters, as the Board never allowed more than ten years for these.

The CHAIRMAN said the Committee would grant the Corporation borrowing powers amounting to £53,000 for general capital, repayable in thirty years [the Bill asked for forty years for the whole amount], and £10,000 for meters repayable in ten years. This was substantially all that the promoters were asking, except the loan for land, which had been withdrawn.

Mr. VESEY KNOX, referring to the calorific power clauses, which proposed a standard of 540 B.Th.U. with a margin of 7½ per cent. before penalties began, said that these were in substance the same as those in the Gas Light and Coke Company's Act; the penalties being £2 where the deficiency does not exceed 14 B.Th.U., £5 where it does not exceed 28 B.Th.U., and £10 for each complete 28 B.Th.U. in deficiency. There were, however, to be no penalties where it was proved that the causes of the deficiency were beyond the control of the Corporation; but insufficient funds was not to be a reason.

These clauses were passed by the Committee.

There were several clauses dealing with stand-by supply. In one a minimum payment of £5, in addition to the charge for gas consumed, was suggested where the consumer had a separate gas supply. There was also another clause providing for minimum payments in the case of consumers having separate supplies of electricity. The authorities of the House, however, had objected to these clauses, and a new one is to be inserted providing for one minimum annual charge, including the charge for the gas actually consumed in the case of all classes of consumers.

A clause authorizing the Corporation to charge an additional 10d. per 1000 cubic feet for prepayment meter consumers where the meter and fittings are included, 1s. where a cooker is also provided, and 6d. where neither fittings nor cookers are supplied, was the subject of an objection by

Mr. KNIGHT, who pointed out that the Corporation were now only charging 3d. extra.

Mr. VESEY KNOX explained that this was a limiting clause in favour of the consumers. It was the present model form, and replaced the old model form under which the Corporation were working.

Mr. KNIGHT withdrew his objection, and the clause was allowed.

Clause 54 gives power to purchase gas in a crude or partially purified state, and is in the same form as that granted to the Middlesbrough Corporation last year.

Mr. *Watson* said this clause was likely to be an advantage to the Corporation in the next few years. At present there were no coke-ovens within the limits of supply; but projects were under consideration for establishing them. A company with a process of coal distillation were thinking of putting up works in Doncaster. This process involved the manufacture of gas for which there would be no other market than the Corporation; and this gas could be produced cheaper than the Corporation could make it in the ordinary course. In Middlesbrough they claimed to have saved 3d. per 1000 cubic feet by utilizing gas of this character.

The Committee granted the clause.

The water portion of the Bill provides for the construction of a new service reservoir, for which borrowing powers of £16,000 were granted.

SPENNYMOOR AND TUDHOE GAS BILL.

The Unopposed Bills Committee of the House of Lords dealt with this Bill last Tuesday.

A calorific test identical with that in the Ilfracombe Bill is inserted. The Bill authorizes the Company to raise £40,000 additional capital, and also confers a number of general powers.

The Bill was ordered to be reported for third reading.

ILFRACOMBE GAS BILL.

The Unopposed Bills Committee of the House of Lords had this Bill under consideration last Tuesday.

The Bill authorizes the Ilfracombe Gas Company to supply electricity within their gas limits, makes the Company a sliding-scale undertaking, with a standard price of 3s. 8d. and a 5 per cent. standard dividend, and gives further powers as to capital. A calorific power test is prescribed.

Mr. LEES (Parliamentary Agent) said the only point on the Bill was with regard to the calorific value test. The figure in the Bill was 500 B.Th.U., without any margin before penalties can be inflicted.

The CHAIRMAN said the Board of Trade had agreed to this.

The Bill was ordered to be reported for third reading, subject to one or two drafting adjustments.

The penalties in the calorific powers clauses are the same as in the Doncaster Bill.

Truro Electric Lighting Scheme.—The Truro Corporation have been informed by the Local Government Board that the present time does not seem opportune for the raising of a loan of £10,000 for the installation of the proposed municipal electric lighting scheme. The Town Council have instructed a Committee to consider the matter.

LEGAL INTELLIGENCE.

A PUMPING-STATION RATING APPEAL.

SUPREME COURT OF JUDICATURE—COURT OF APPEAL.

Saturday, March 6.

(*Before Lords Justices* BUCKLEY, PICKFORD, *and* BANKES.)

Chertsey Union v. Metropolitan Water Board.

This was an appeal by the Metropolitan Water Board against a decision given on a special case by the Divisional Court in May last.* It was in respect of certain property known as the Walton Pumping-Station. Quarter Sessions having reduced the gross value from £15,810 to £11,677, and the rateable value from £10,550 to £7785, the Union appealed to the Divisional Court, who remitted the case back to sessions for the Magistrates to determine the added value in accordance with the decision in *New River Company v. Hertford Union*.

Mr. BALFOUR BROWNE, K.C., Mr. FREEMAN, K.C., and Mr. JACQUES ABADY, who held the brief of Mr. H. Fletcher Moulton, now serving with H.M. Forces (instructed by Mr. Moon), appeared for the appellants. Mr. PAGE, K.C., and Mr. W. W. MACKENZIE, K.C. (instructed by Mr. Percy H. Webb for Messrs. Paine, Brettell, and Porter), represented the Rating Authority.

Mr. BALFOUR BROWNE, in opening, said that the question was raised by a special case stated on appeal by the Metropolitan Water Board to the Surrey Quarter Sessions. The question shortly was how the intake from the Thames, the pumping-station, and a line of pipes and premises at Chertsey belonging to the Water Board, ought to be rated for the poor rate made on May 9, 1912, for the parish of Walton-on-Thames. There was no question as to the liability of the premises to be rated for the relief of the poor. At one time it was thought that property which did not yield a profit was not rateable; but it had now been held in various cases that it was not "profit," but "benefit," which must be looked at in order to decide whether such premises were rateable. Looked at from this standpoint undoubtedly the works in question were liable. But while this was so, a distinction was drawn between such parts of an undertaking as produced direct benefit to the owner and those parts which were not directly beneficial. The Metropolitan Water Board had acquired a right to take water from the Thames upon payment to the Conservators of certain sums of money. In exercise of this right they received, at their pumping-station and premises at Apps Court, the flow of water from the Thames over a piece of land in their occupation, called an "intake." The Divisional Court held that this intake should be rated in an additional sum beyond its structural value and its value as land, as having an enhanced value by reason of its fitness for the user made of it in taking water from the river. There was also the circumstance to be considered that the Board could borrow money, *quâ* Water Board, at less than 4 per cent. The Court below held that, in spite of this fact, there was no reason for departing from the usual practice adopted by assessment committees in assessing hereditaments, of taking 4 per cent. on the purchase price of the land and 5 per cent. upon the cost of the buildings.

The hearing was adjourned till the following Monday, when Counsel for the respondents were not called upon, and the appeal was dismissed with costs.

Judgment.

Lord Justice BUCKLEY said this was an appeal by the Metropolitan Water Board in the matter of an assessment made on them by the Chertsey Union. The Board were the successors in title of the Southwark and Vauxhall Water Company, who in 1898 obtained an Act of Parliament under which they were authorized to make a pumping-station, an aqueduct, and a line of pipes; and they acquired the land on which the pumping-station was erected and the pipes laid. The Company were succeeded in 1902 by the Water Board, who, in fact, erected the works. As a result, they constructed an "intake" from the River Thames which was laid through a culvert under the towing-path, which did not belong to the Board at all; and it then passed through land, which they had acquired, to the pumping-station. Under the Act of 1911, the Board had to pay to the Conservators of the River Thames the annual sum of £40,000 for many things—including the fact that they had acquired the benefit of the intake. The Board became entitled to certain land, for which they paid £4000; and on this land works were erected at a cost of £151,516, and they enjoyed the user of the passage through the land over which the towing-path ran and the privilege of drawing water from the river. The Rating Authority had rated the Board on the footing that they ought to pay 4 per cent. on the £4000 and 5 per cent. on the £151,516; and the question to be decided was whether they should be charged a further sum representing what was called in the Hertford case a "sum beyond the structural figure"—the value of the land as land having an enhanced value by reason of its fitness for taking water from the river. It was said there was no special fitness in this particular intake, as the Board might go elsewhere. But the fact that they had other intakes was a factor in determining the special value of this intake. It was also said that no further sum ought to be added, as the further sum had been taken into account already; the £4000 paid for the land being an increased sum, as the land was worth more to the particular buyer as it was going to be used in a particular way. The Magistrates found that the facts were clearly distinguishable from those in the Hertford case, and that nothing ought to be added in respect of the adaptability of the land for the particular purpose. The Divisional Court had decided that a further sum ought to be added; and he (Lord Justice Buckley) thought they were right in so deciding. The fact that the Board paid £4000 a year for certain things was not the measure of the additional value of the land as indicating the figure of the assessment value on which the rate was to be calculated. The Divisional Court

* See "JOURNAL," Vol. CXXVI., p. 513.

were clearly right in saying that the matter should go back to Quarter Sessions to say what additional sum ought to be added upon the footing of the Hertford case, as being the proper measure of the enhanced value of the land by reason of its fitness for the use made of it—viz., the taking of water.

Lords Justices PICKFORD and BANKES concurred.

THE CARDIFF COAL CONTRACT DISPUTE.

At the Glamorgan Winter Assizes last week, before Mr. Justice Lush and a Special Jury, an action was heard in which the parties were Mr. Thomas Taylor, owner of the Energlyn Colliery, Caerphilly, and the Cardiff Gas Company. Mr. Taylor originally brought an action against the Company for payment for certain coal; and the Company, while admitting the claim, counterclaimed for some £1100, the difference between the contract price and the market price of coal they had bought elsewhere. The case was tried at these Assizes twelve months ago [see "JOURNAL," March 17, 1914, p. 757]; and the Jury found that there had been no breach of contract, because an accident in January, 1913, had stopped the working of the coal. Judgment was accordingly given against the Company; and from this they appealed. It was argued for them that the question was not whether there had been an accident in January, but whether there had been one in September, 1912, when the shortage of delivery first began. The facts were stated in the "JOURNAL" for Feb. 9 last [p. 328]. The decision of the Court of Appeal was that there must be a new trial, as the Jury had not returned a finding as to the shortage of delivery between September, 1912, and Jan. 31, 1913. It was in these circumstances that the matter again came up for trial at the Glamorgan Assizes.

Mr. HOLMAN GREGORY, K.C., and the Hon. TREVOR LEWIS appeared for the Gas Company; Mr. RALPH BANKES, K.C., and Mr. ST. JOHN FRANCIS WILLIAMS represented Mr. Taylor.

Mr. HOLMAN GREGORY explained that a contract had been entered into between the parties whereby Mr. Taylor was to supply the Company with 25,000 tons of coal between June, 1912, and June, 1913, in such regular quantities as should be required by the Company. One of the terms of the contract was that Mr. Taylor should supply the coal unless the working of it should be stopped by accident. Mr. Taylor began to supply coal under the contract in August, 1912; and in October he was requested by the Company to deliver at the rate of 130 tons per day. The Company held that the coal should have been delivered at this rate during October, November, December, and January; but Mr. Taylor was short in his deliveries over this period to the extent of 4239 tons. In consequence of this, the Company had had to purchase coal elsewhere at an increased cost of 4s. 6d. per ton; this working out at a loss of £953 15s. 6d. The accident which Mr. Taylor said had caused the shortage in delivery was due to an inrush of water into the pit.

Mr. BANKES said that Mr. Taylor had delivered coal to the value of £700 or £800. The Company did not pay the bill; and a counterclaim was set up by way of reply. The bill was, however, subsequently paid. A clause in the contract provided for accident, whereby, if the working of the colliery was stopped Mr. Taylor would be relieved of delivery. He had made proper provision against accident by installing suitable pumps and machinery, such as would have been reasonably necessary. But there came an extraordinary inrush of water, which no man could foresee or make provision against. This occasioned a considerable decrease in the output of coal; and it was claimed that it constituted an "accident" within the meaning of the contract.

Evidence as to the pumping power available was then given.

Mr. *Taylor* stated that he did his utmost to fulfil the contract with the Gas Company. They had a big proportion of the coal it was possible to raise.

Mr. *Leonard Llewelyn* stated that the only effective method by which the flooding of the colliery could have been dealt with was by the sinking of a new shaft. This would have cost about £27,000.

Mr. *David Jones*, Sales Manager at Cardiff for Mr. Taylor, said that during the inundation he was in daily communication with Mr. George Clarry, the Gas Company's General Manager, or Mr. Gilbert, explaining the difficulties with which they had to contend. Although they had contracts with other people at the same time, they supplied the Gas Company with more than their proportion of the coal raised.

Professor *Galloway*, for the Company, maintained, on the other hand, that there was sufficient margin of pumping power in the pit up to August or September, 1912. When more water came than the pumps could reasonably deal with, additional pumps should at once have been installed.

Mr. *George Clarry* said he knew from correspondence that there were difficulties with water in the colliery; but he received no notice of any stoppage, and was never told that there had been any substantial interference with the working of the coal.

His LORDSHIP, in summing up, said that if it had not been for the accident clause in the contract, Mr. Taylor would have had no answer. This clause read: "In case of accident, by which the working of the coal shall be substantially interfered with, the contractor shall immediately thereupon give notice thereof to the Gas Company; and during the continuance of such interference the contractor shall not be deemed to be in default."

Four questions were put by the Judge to the Jury; and their findings were as follows:

1.—That there was an accident which continued for the whole period.

2.—That it substantially interfered with the working of the coal from the date of the accident.

His LORDSHIP: That means over the whole period?

The FOREMAN: Yes.

3.—That the requirement of 130 tons a day was reasonable for two months.

4.—That Mr. Taylor did give notice to the Company of the interference by water.

His LORDSHIP intimated that judgment would be given in London as soon as practicable.

MISCELLANEOUS NEWS.

SHEFFIELD UNITED GAS COMPANY.

The Ordinary General Meeting of this Company was held on Monday last week—Mr. WILSON MAPPIN (the Chairman) presiding.

The report of the Directors, with the accounts for the year ended Dec. 31, was noticed in the "JOURNAL" for the 16th ult. (p. 402).

The CHAIRMAN, in moving the adoption of the report, said the shareholders would have seen therefrom that the sale of gas had again been satisfactory, though the profit on the year was very considerably below the amount required to pay the dividend. This condition of affairs had been brought about by the increased cost of everything used by the Company, but more especially coal and wages. The price of coal last year was as much as 3s. 8d. per ton higher than was paid in 1905, in which year the average price of gas was 1s. 5 37d. per 1000 cubic feet, while last year it was 1s. 1·3d. It would appear that gas was the only commodity which had not risen in price during recent years. How long this happy state of things would continue, the Directors were unable to foresee; but unless some change for the better took place, they were afraid an advance would have to be made. It had always been the desire of the Board to serve the public with a good article at the lowest possible price; and he thought this fact had been generally recognized and appreciated by the people of Sheffield.

EFFECT OF THE WAR ON RESIDUALS.

It must also be borne in mind that, in addition to the increased expenditure, there had been a very considerable drop in the price of residuals. The war especially affected tar and sulphate of ammonia; the former because pitch, which constituted a large proportion of its composition, was in ordinary times shipped in great quantities to France and Belgium for the purpose of making patent fuel, which was used on the railways in those countries. At the present time the demand for this had come to a standstill, and the pitch had to be stored in this country until the end of the war. The value of sulphate of ammonia was also influenced by the high rates of freight due to the scarcity of steamers. With regard to coke, there were large stocks at most of the gas-works in the kingdom at the commencement of the winter. These had now all been cleared out. So far as the Company were concerned, there was a great demand at the present time; but they were faced by serious difficulties owing to the shortage of carts and railway waggons.

THE YEAR'S ACCOUNTS.

As to the accounts, the shareholders would find that coal, owing to the Directors having made contracts at lower prices in August last, showed a decreased cost of £9717, as compared with 1913; and repairs of works had been £4975 less. On the other hand, purifying material and wages showed an increased expenditure of £687; and stokers' wages £2696. This item did not include the other classes of workmen whose rates of pay were increased in November, 1913, the cost of which was spread over the various items in the accounts. Repairing mains and services was £730 more; repairing, renewing, and refixing meters, £1344 more; depreciation of meters and stoves, £381 more; rates, £268 more; salaries of collectors, £384 more; bankers' charges, &c., £772 more; and workmen's compensation and National Insurance, £208 more. There was a new item of £635 in the accounts—being payments to dependants of men who had joined the Army. On the other side there was an increased revenue for gas of £2136, and meter and stove rents of £878; and the earnings of the Company's railway waggons were £279 more. As against these increased receipts, there was a decrease of £19,800 in the amount received for coke, for tar £3501, for sulphate of ammonia £5184; in the fitting department, £843; and interest from bankers was £2257 less. The net result was that they had to take from the amount carried forward from previous years £34,735 in order to pay the dividend. The capital account was overspent by £46,207. This had been mostly due to the outlay on extensions at Grimesthorpe, which had become necessary in order to meet the ever-increasing demand for gas.

GAS-FURNACES FOR METALLURGICAL WORK.

A total of 106,739 meters were in use at the end of the year. The increase over 1913 included twelve for 400 lights, four for 500, six for 600, four for 800, two for 1000, three for 1200, and one for 2000 lights. The larger-sized meters were for furnaces, the addition to which during the year had been 74, of a total value of £4502. Messrs. Brayshaw, of Manchester, had recently been holding an exhibition, which he understood had been largely visited by manufacturers who had been able to see the furnaces in use; and he might again call attention to the Company's show-room in Shude Hill, where employers might send their own workmen and materials to make any experiments they might think well, in order to compare the results obtained by gas with their present methods of heating, &c. During the past year 69 additional gas-engines were fixed, varying in size from 1 to 475 H.P.; the total horse power being 3400. Altogether 20,058 incandescent burners and 2892 boiling, grilling, and other stoves were sold, and 805 additional cooking-stoves were let on hire.

PATRIOTIC EMPLOYEES.

The shareholders would be interested to hear that 272, or 19¾ per cent., of the Company's employees had joined His Majesty's Forces. As would be seen by the item in the accounts already referred to, the Company were augmenting the allowance made by the Government to their families, and had, in addition, undertaken to find employment for them at the termination of the war. They must all admire the patriotism and self-sacrifice displayed by these men; and he hoped those who, for various reasons, had not been able to follow their example would recognize the responsibility that rested with them to do their part in the service of their country by working energetically to keep business going during the absence of their comrades. This

was especially important in Sheffield, where so much material was being manufactured for the Government.

Mr. B. G. Wood seconded the motion; and it was carried.

A dividend of 5 per cent. for the half year ended Dec. 31 having been declared, the retiring Directors—Sir Robert Hadfield, Colonel H. K. Stephenson, and Mr. B. G. Wood—were re-elected.

A vote of thanks was passed to the Chairman and Directors and the officials of the Company.

The Chairman, in acknowledging the vote, expressed the hope that on the next occasion they would meet under happier auspices.

ILFORD GAS COMPANY.

The Half-Yearly Meeting of the Company was held at the Offices on Monday last week—Mr. W. Ashmole (the Chairman) presiding.

The Secretary (Mr. G. H. S. Iorns) having read the notice convening the meeting, the report and accounts were taken as read. In the course of their report, the Directors stated that the volume of gas sold showed a decrease of 0·819 per cent. as compared with the corresponding period of last year. They thought this might be considered satisfactory, having regard to the reduction in lighting under the police regulations made in pursuance of the Defence of the Realm Act. They regretted to report that they had been compelled, owing to the high cost of coal and the low prices realized for residual products, to increase the charge for gas 1d. per 1000 cubic feet from Christmas last. They added that the action brought by the Attorney-General (at the relation of the Company) against the Ilford Urban District Council had ended in a completely satisfactory manner. The accounts accompanying the report showed a balance of £7048 to go to the profit and loss account. After providing for the interest charges, the sum available for distribution was £27,547; and out of this the Directors recommended a dividend for the half year at the rate of £7 17s. 6d. per cent. per annum on the "A" and "C" stocks, and £6 7s. 6d. per cent. per annum on the "B" stock, subject to the deduction of income-tax. These payments would amount to £7254, and leave a balance of £20.292 to be carried forward.

The Chairman, in moving the adoption of the report, said that never before in the history of the Company had the shareholders met under such critical conditions as those existing. The present war had necessarily affected business generally; and gas companies were not exempt. As regards the Company's business, practically everything necessary for carrying it on had advanced in price. The situation with regard to coal had been very trying; and the Board had given the closest attention to the matter. They entered into contracts for Durham and Yorkshire coal at prices which were very favourable compared with previous contracts; but, unfortunately, before these were properly commenced they had to pay an increased price owing to war risks. At first this only amounted to 1s. per ton; but it had gradually risen until they were now paying prices ranging from that figure up to as much as 6s. a ton. The contract for Durham coal was practically cancelled. They were only receiving about 300 tons per month out of a total quantity of 1800 tons contracted for; and on this 300 tons they had to pay 6s. per ton over and above the contract price. To make up for the loss of the Durham coal, the Board had to purchase outside quantities of Yorkshire coal, delivered by rail to Ilford Station at prices ranging from 19s. to 22s. per ton. On top of this they had the charge for carting; and by the time the coal was in the stores the cost was very heavy. The Directors had always considered it a wise policy to carry good stocks of coal in case of emergency. At the outbreak of the war, owing to the excellent management of their Engineer, they were fortunate in having a large stock; and though they had had to eat into it to a certain extent, they still retained a considerable portion. He was pleased to say that the coal purchased by rail outside their contracts was being delivered in a satisfactory manner. Respecting the oil required in the manufacture of carburetted water gas, fortunately no alteration had been made in the present contract, which was a very favourable one, and carried them up to the end of June next. The Directors had now completed a new contract for a further year ending June, 1916, but at an increased price. With regard to residuals, the coke market had been a very poor one for the last year or two; and though at present this residual was commanding a high figure, the half year under review did not benefit to a great extent by the advance. The sulphate of ammonia market had also been very weak; but it was now quite good. With regard to tar, however, the position was reversed. A year ago they were receiving a very good price for it; but it had decreased in value since the commencement of the war, and the market showed no signs of improvement. About 20 per cent. of the Company's employees were serving with His Majesty's Forces, the majority being in Territorial units. The Chairman then proceeded to compare the items in the accounts with those for the corresponding period of the previous year. Referring to the action against the District Council, he explained the circumstances which gave rise to it, and said it went entirely in favour of the Company. He expressed the hope that in future the Council would conduct their business in accordance with the powers Parliament had given them, and not imagine that their position as makers of bye-laws, and in many respects enforcers of the law, rendered them less amenable to the law themselves.

Mr. T. J. King seconded the motion, and it was carried unanimously; and the dividends recommended were declared.

The retiring Directors and Auditor having been re-elected, a vote of thanks was accorded to the Board.

The Chairman, in acknowledging the compliment, said he believed the Company would pull through securely, not only as the result of the backing-up of the stockholders, but of the very efficient manner in which the business was carried on by the Engineer and the Secretary. A great deal was owing to the Company's staff; and he proposed a vote of thanks to the officers, staff, and workmen.

The proposition was carried unanimously, and acknowledged by the Engineer and Manager (Mr. W. B. Farquhar) and the Secretary. A vote of thanks to the Chairman brought the proceedings to a close.

STRIKE OF GAS-WORKERS AT BIRKENHEAD.

The men employed at the Birkenhead Gas-Works, numbering 150, including all classes, through their representatives, recently made an application to the Wages Committee of the Corporation for an immediate increase of wages equal to 5s. per week for seven-day men and 4s. for six-day men. They also demanded a reduction of the working hours from eight to six per day. The war bonus of 2s. already granted by the Council was not considered sufficient. The demand not having been granted, the men ceased work last Thursday; and the first serious result of their action was experienced next night, when the householders had a very poor supply of gas, and the streets, except those lighted by electricity, were practically in darkness.

A statement in regard to the strike situation was made on Friday night by Alderman M'Gaul, the Chairman of the Gas Committee. In the course of it he said that after the employees ceased work several portions of the machinery were found to be damaged, rendering it impossible for the engineers to produce gas; and they had only the stock to work upon. An examination revealed the presence of a large piece of timber tightly wedged in the coal-breaker; and after twenty hours' work the officials were able to remove it. Since then they had succeeded in getting things into working order, and by Monday the Committee hoped to be in a position to give a fair average pressure of gas, though it would still be necessary to economize. The Committee had been able to obtain extra workers to assist the engineers and to utilize the services of the clerical staff, some of whom had been working for 42 hours at a stretch. Since the strike the gas-works have been surrounded by pickets; and the men working inside have been lodged and boarded on the premises. The local battalion of "Comrades" known as the "Bantams," stationed at the Bebington Show Grounds, readily responded to an appeal for volunteers; and on Friday evening 25 of them were taken to the gas-works to act as stokers. After working for several hours, they were relieved by others.

In the course of an interview last Friday, Mr. Fleming Eccles, the Organizing Secretary of the Gas-Workers' Union, explained that the claim for a six-hour day only referred to six men engaged on the vertical retorts. The actual wages earned by these men is 5s. 4d. per shift, making a total of 32s. a week of six days. If the men work seven days they receive £2. Only three men receive 43s, a week, and they are head foremen. Of the remainder, 24 men receive 5s. 4d. per shift. The yardmen receive 27s. for the 54-hour week, which is less than 6d. per hour.

The town was again in comparative darkness on Saturday night. Though the quality of the gas was improved, many shopkeepers had to use candles and small oil-lamps to enable them to carry on their business. During the week-end the work of making gas was carried on as satisfactorily as could be expected. The "Bantams" were again assisting the officials in stoking and firing on Sunday. In nearly all parts of the town cooking was carried on with comparative convenience by householders using gas-cookers; and at night the streets were better lighted, though the illumination was not up to the customary standard.

A mass meeting of the men on strike was held at the Birkenhead Park gates, when Mr. Fleming Eccles strongly protested against the statement that the men had deliberately spoiled the machinery at the gas-works before they stopped work. This was disproved by the fact that it was after the men had left that the coal-breaker broke. The charge was made purposely against the men in order to arouse public sympathy.

NEATH GAS MANAGEMENT.

A Mid-Glamorgan Correspondent last week had an interview with Mr. R. A. Browning at his Neath residence, when he gave his views regarding the treatment that had been meted out to him. Mr. Browning said he could not understand it. The whole thing came like a bombshell on him, especially after all the years of service he had devoted to the interests of the gas undertaking in Neath. "And with good results, too," he added, "notwithstanding the trials of the past few years; for I have reduced the price of gas to less than half the amount it was when I came here." Mr. Browning then proceeded to outline the course of events, including the disastrous coal strike of 1913, the strike among the gas workers, and an unfortunate occurrence in the financial department for which he was not responsible. "During the gas strike," he said, "an unhappy deadlock which could have been averted if the Council had only adopted my suggestions, I worked day and night with a handful of imported labour, men who were practically useless; and as a result the town was in darkness only for two nights."

Mr. Browning stated that the whole situation arose out of the action of certain members of the Gas Committee, and that the threats they held out to him left him no alternative but to resign or be "kicked out." "It is shameful, scandalous treatment," he declared warmly, "particularly as they cannot be prevailed upon to give any reasons for their action. It seems strange that they should have taken 35 years to discover that I was not competent to carry on the duties of Manager, and then, in the face of that, to appoint me as their Consulting Engineer for the next three years. The ratepayers are supporting me right loyally. They are showing an appreciative recognition of what I have done for them by bringing down the price of gas. The Council have been approaching me to try and stop the public meeting. I am, however, going to do nothing in the matter, one way or another."

In an article which appeared in a Swansea paper on Saturday regarding the matter, the writer asks: "Can the Neath Town Council throw off its own responsibilities? The doctrine is dangerous, because the logical conclusion would be that all municipal undertakings should be absolutely controlled by the paid officials."

Price of Gas at Warrenpoint.—The Warrenpoint Gas Company, Limited, have decided to raise the price of gas from 5s. 2d. to 5s. 10d. per 1000 cubic feet, from the 25th inst.

LAMBETH PUBLIC LIGHTING.

An Improved Scheme Adopted.

For upwards of a year negotiations have been going on between the Lighting Committee of the Lambeth Borough Council and the Gas Light and Coke Company on the question of improving the public lighting of the Company's area; and the Committee have lately issued a report on the subject. They found the lighting unsatisfactory, and sent their complaint to the Company, who admitted the justice of it. But they pointed out that the present unit of light in the borough could not, however well it was maintained, be regarded as sufficient for modern requirements of street lighting. They suggested that the time was ripe for improvement; and they submitted a scheme for consideration. Subject to the street lighting in their area being entrusted to them for a period of seven years, they undertook, within four months of the signing of the agreement, to carry out, at their own cost, the improvements specified, and at the inclusive prices named. The proposed alterations would, they said, result in an increase of 62 per cent. in the effective lighting of the streets—viz., from 72,000 to 117,000 candle power; while the increase in cost would be only from £2235 to £2409 per annum, or less than 8 per cent. If the existing system were retained, they offered, on a five-years' agreement, to reduce their prices by 2s. 6d. per large and 1s. 6d. per small burner respectively per annum, and to reduce proportionately the prices of the multiple-burner lamps according to the number of burners in each.

The Company were then asked whether they would be prepared to enter into an agreement for the improved lighting of their portion of the borough for five instead of seven years, as from April 1, 1915, on the following terms: To make fixed inclusive charges for the supply of gas, lighting, and the upkeep of lamps. Those in the main roads to be new circular lamps, each fitted with two large inverted burners, at the rate of £4 per lamp per annum, with *pro ratâ* variations in respect of sundry lamps which are kept in lighting for longer hours than the bulk of the lamps, and with corresponding reductions in the prices now charged for two, three, and four burner lamps (a selected list of lamps to be dealt with under this heading); and those in the side streets to be fitted with large inverted burners, at the rate of £2 2s. per lamp per annum—the charge for the seven lamps kept constantly alight to be £3 10s. each. In reply, the Company agreed to the terms suggested, providing that corresponding reductions in the charges now made for two, three, and four burner lamps should be in accordance with prices previously quoted. The Company also agreed to convert so many of the single large-burner lamps to the two large inverted burners as the Committee might select; and, further, within limits, to convert a smaller number than 595 lamps from the single small to the single large inverted burners.

The Committee expressed the opinion that the terms suggested and conditionally agreed to by the Company should be accepted; but that, in view of the limitation of public lighting which will be in force for an indefinite period, the new agreement should not come into operation until such time as the restrictions with regard thereto are removed. To this proposal the Company have agreed.

The report came before the Borough Council at their meeting last Friday, and was adopted.

LIVERPOOL PUBLIC LIGHTING.

The City Lighting Engineer's Report.

There has been issued, by order of the Lighting Sub-Committee of the Liverpool Corporation, the annual report of Mr. A. G. Smith, the City Lighting Engineer, on the work of his department during 1914. This work, he remarks, has been of the usual routine character; the only items of special interest being the automatic lighting and the testing of the gas supply under new regulations, which came into operation on Oct. 1.

Automatic Lighting.

It was estimated that the usual 3000 controllers would be fixed, and that, in addition, the newly incorporated districts of Woolton, Allerton, and Childwall would be installed; but, owing to the difficulty of obtaining material and the shortage of labour experienced since August, only 2416 have been fixed, including the districts mentioned, which were completed early in the year. The total number of lamps installed with controllers is now 13,053, which is approximately two-thirds of the total number to be dealt with.

In consequence of the installation of automatic controllers, the lamp-lighting staff has been reduced; and the work at the end of the year was being carried out by six foremen and 68 lamplighters, including two oil-lamp lighters—a total of 74, as against 90 at the close of the previous year. The average number of lamps dealt with by each lighter was 103.

Gas Testing.

Under the Liverpool United Gas Light Company's Acts of 1865 and 1880, the gas has hitherto been tested for illuminating power, purity, and pressure; and additional tests have been made for calorific power and specific gravity. Also complete analyses have been made, principally for ascertaining the percentage of carbon monoxide in the gas, which indicated approximately the proportion of carburetted water gas in the gas supply. The illuminating power tests were made daily at the Engineer's office and, by arrangement with the Gas Company, twice weekly at various parts of the city, during the hours of lighting. The purity (sulphur compounds) tests were made at each of the works twice weekly; and pressure records were obtained daily at various points in the city in a police or other corporation establishment.

Under the Liverpool Gas Act, 1914, tests are made of the calorific and illuminating power, pressure, and to ascertain the presence of sulphuretted hydrogen, the results of which are forwarded daily to the Gas Company. Also, for the Committee's own information, an analysis of the gas is made to ascertain the extent of the presence of carbon monoxide in the gas supply. The standard calorific power is fixed at 550 B.Th.U. per foot of gas, gross, with a margin of 5 per cent., beyond which penalties are enforceable. No standard has been prescribed for illuminating power; but tests by the flat-flame burner are to be taken for record purposes only. It will be seen from the figures given later that the gas is of a much lower candle power than formerly.

The pressure at which the gas is to be supplied is prescribed in the Act, but without any penalty clauses. All tests are made at the Gas Company's stations, with apparatus provided and maintained by the Company and approved by the Corporation. As under their new powers the Company have been relieved of liability for sulphur impurities, the tests to ascertain the extent of their presence have been discontinued, except in the case of sulphuretted hydrogen.

Tests under Old Statutes.

The following are the results of all tests made during the nine months ended Sept. 30:—

Illuminating Power.

Place.	No. 2 "Metropolitan" Argand Burner.		No. 7 Steatite Batswing (Flat-Flame) Burner.	
	No. of Tests.	Average Illuminating Power.	No. of Tests.	Average Illuminating Power.
		Candles.		Candles.
Office	235	19·68	235	14·65
District	71	20·59	71	15·00

Calorific Power.—235 tests have been made, showing an average of 605·84 B.Th.U. per foot of gas, gross.

Specific Gravity.—235 records have been taken; the average being 0·529.

Carbon Monoxide.—303 samples of gas have been taken in various parts of the city, and analyses made at the laboratory in Highfield Street, the average of which revealed the presence of 13·97 per cent. of carbon monoxide, representing an admixture of 31·7 per cent. of carburetted water gas. The maximum quantity—59·1 per cent. of carburetted water gas—was found at Garston; and the average of the tests in this portion of the city indicated the presence of 47 per cent.

The samples have also been tested for other constituents, with the following average results:—

	Per Cent.
Carbon dioxide	1·10
Oxygen	0·54
Heavy hydrocarbons	6·34
Methane	29·10
Hydrogen	39·27
Nitrogen	10·65

Sulphur Compounds.—The following table shows the statutory limitation of sulphur compounds, together with the average results of 215 tests, involving 350 visits to the various works:—

Gas-Works.	Grains per 100 Cubic Feet.	
	Statutory.	Actual.
Wavertree	25	15·64
Caryl Street	25	15·00
Eccles Street	25	18·74
Athol Street	25	16·73
Linacre (Summer months—April to Sept.)	18	21·57
(Winter months—Jan. to March)	22	19·13

In addition to the foregoing, 43 tests have been made at the laboratory in Highfield Street, to ascertain the extent of the presence of impurities, with the following results:—

	Average.
Sulphur compounds—grains per 100 cubic feet	18·36
Ammonia " " "	0·46
Sulphuretted hydrogen	Entirely free.

District Pressure.—1440 visits have been paid to the seven pressure-testing stations throughout the city; the following being the average recorded maximum and minimum at each of the stations, in tenths of an inch water pressure:—

	Maximum.	Minimum.
Highfield Street	31⅜	20¾
Argyle Street	29¼	17¼
Margaret Street	33	22⅜
Athol Street	31	21⅜
Harlow Street	32	22⅛
Durning Road	31	22⅛
Derby Road	29	19⅜

Tests under New Statute.

The following are the average results of the tests made at each testing-station during three months October to December, involving 145 visits:—

Station.	B.Th.U. per Cubic Foot of Gas. Gross.	Illuminating Power Candles Flat-Flame.	Carbon Monoxide.	Approximate Admixture of Carburetted Water Gas.
			Per Cent.	Per Cent.
Wavertree	550·01	11·51	15·5	38·2
Caryl Street	547·34	11·71	16·6	42·9
Eccles Street	549·82	11·58	16·2	41·2
Athol Street	543·21	10·75	18·6	51·4
Linacre	558·68	11·82	18·1	49·3
Garston	560·57	12·55	19·2	54·0
Average	551·60	11·65	17·3	45·9

The gas has been entirely free from sulphuretted hydrogen, except on one occasion at Garston, when slight traces were found.

The pressure of the gas sent out from the works has been well maintained above the prescribed minimum—twelve-tenths of an inch water pressure.

FAZAKERLEY GAS-WORKS.

Periodical tests have been made during the year at the Fazakerley Gas-Works; the average results of 52 tests with the No. 2 "Metropolitan" argand burner being 18·23 candles, as against a standard of 20 candles.

PUBLIC LIGHTING.

Gas.

District.	Length of Roads Lighted. Miles.	Number and Description of Lamps in Streets.				Total Lamps.
		Flat Flame.	Incandescent.	Oil.	Total	
Old City .	267⅜	140	9,286	..	9,426	12,586
Suburbs .	226	25	5,986	93	6,104	7,410
Totals .	493⅜	165	15,272	93	15,530	19,996

Compared with 1913, this is a net increase of 113 lamps.

Electric.

The following were the number and types of lamps in use at the end of the year: Arc—Open, 8; flame, 192; total, 200. Metallic Filament—Incandescent, 788. This gives a total number of electric lamps of 988.

The total length of roads lighted at the end of the year, including the recently-added areas, but irrespective of courts and passages, amounted to 501¾ miles; 8⅜ being by electricity, 485¼ by incandescent gas, 3⅜ by flat-flame burners, and 4½ by oil.

The entire maintenance of the columns, brackets, lamps, and fittings is carried out by a staff of 64 mechanics, &c.

During the year a revenue of £279 was obtained from the sale of material, including 152 lbs. of mantle ash.

GAS-METER TESTING.

The work in this department has again been of a heavy character; the number of meters tested being 15,786, the fees for which amounted to £549. Of the 285 dry meters submitted by the Liverpool Gas Company only 13 were rejected; of 6462 wet meters, 67 were rejected; and of 3342 prepayment meters, 108 were rejected.

ELECTRIC METER TESTING.

The number of electric meters tested was 4541. The Electric Department submitted 3166, of which 1872 were approved, and 1294 were rejected.

CONSUMERS' GAS-PIPES AND FITTINGS.

During the year 39 tests have been made; and 92 per cent. of the pipes and fittings tested were unsound.

NAPHTHALENE.

During the year the department dealt with 7559 reports of failures in the gas supply to the public lamps, due to the presence of naphthalene, all of which were reported to the Gas Company from time to time.

EXPENDITURE.

The total charges in connection with the public lighting of the city and the supervision of the gas supply for the year amounted to £53,760. A revenue of £3976 has been derived from work charged to other departments and bodies, including a large portion of the gas-fitting work of the Corporation, which last year was again heavy. The net expenditure was therefore £49,784.

In conclusion, it is stated that 34 men in the employ of the Committee have joined His Majesty's Forces.

DUBLIN GAS AND ELECTRICITY CHARGES.

The Alliance and Dublin Consumers' Gas Company announce a big reduction in the price of gas for power; the new scale of prices being down to 1s. 9d. per 1000 cubic feet. They add that the tendency is towards "an all-round decrease in price." At the Company's showrooms in Grafton Street, a lady cookery expert now attends daily, and demonstrations are given each evening. Arrangements have been made for private lessons by appointment.

A good deal of interest has been aroused by the Company's announcements, owing to the proposal of the Corporation Electricity Supply Committee to increase their charges. This proposal was severely criticized at the Corporation meeting last week; several members condemning the management of the department. Alderman M'Walker said that for many years past flowery fairy stories had been told as to the immense profits which the undertaking would yield; but now they were asked to provide for a probable deficit of £27,000. Ultimately, further consideration of the proposal was postponed until the regular estimates were available.

Issue of Great Grimsby Gas Shares.—An issue of shares (which has, of course, been approved by the Treasury) is being made by the Great Grimsby Gas Company, under conditions which were set forth in the advertisement pages of last week's number of the "JOURNAL." The shares are to be sold by tender; the minimum price being fixed at £16 16s. per £10 share. At the present price of gas – 2s. 6d. per 1000 cubic feet—the authorized rate of dividend is 9¼ per cent. In the year 1924, the sale of gas totalled 269½ million cubic feet; and in 1913 the figure was 354 millions. Tenders are to be sent in not later than the 31st inst.

MANCHESTER CORPORATION GAS UNDERTAKING.

Progress under Alderman Kay's Chairmanship.

Some interesting figures showing the progress made by the Manchester Corporation Gas Department in the hiring-out, &c., of cookers, grillers, and gas fires during the three-and-a-quarter years of Mr. Alderman William Kay's energetic chairmanship of the Gas Committee have been furnished to us by Mr. Fredk. A. Price, the Superintendent of the Department.

Mr. Kay, by the way, was recently unanimously elected to the city Aldermanic Bench by his colleagues on the Council, having entered the civic chamber in 1901 as a Councillor for one of the most densely-populated wards in the city—an entirely working-class area in Hulme. He was Deputy-Chairman of the Corporation Electricity Committee for some time, as well as being a member of the Gas Committee; but eventually he succeeded (in November, 1911) the late Alderman Robert Gibson as Chairman of the Gas Committee. In addition to holding—and honouring—this important office, Alderman Kay is also connected with the Water-Works, Nomination, Official and Workmen's, and other important Committees of the Council.

The figures are as under :—

	Number fixed at November, 1911.	Number fixed at March, 1915.	Increase.
Cookers	57,476 ..	79,975 ..	22,499
Grillers	31,596 ..	36,671 ..	5,075
Fires	60 ..	16,961 ..	16,901

Cookers and grillers are supplied, fixed, and maintained free of charge.

Gas-fires are supplied, fixed, and maintained as follows :—

(1) On simple hire.

(2) On hire-purchase spread over twelve quarterly payments.

The figures are eloquent testimony of the progress made in supplying gas apparatus to the consumers of Manchester.

WAR BONUS SUGGESTED AT MANCHESTER.

Estimated Cost £7800 per Annum.

The Manchester City Council will be asked to adopt to-morrow (Wednesday) at a special meeting a recommendation that a war bonus should be paid to certain workmen in the employ of the Corporation. This recommendation was adopted last Wednesday, at a conference of Chairmen and Deputy-Chairmen of the Council; and the terms of it will be found hereunder. With regard to the Gas Department, we are officially informed that the number of men affected is 1560, and that if the recommendation is adopted, it will involve an expenditure of not less than £7800 net per annum.

The terms of the recommendation are: "That, in order to meet, to some extent, the increased cost of living, the Council be recommended to grant (until otherwise determined by the Council) a war bonus of 2s. per week to every adult employee receiving less than 40s. per week, subject to the following provisions—viz. (*a*) An employees' normal weekly wage and bonus combined shall not exceed in any one week 40s.; (*b*) the bonus of an employee losing time in any week (except sickness, &c.) shall be subject to a corresponding reduction; (*c*) an employee whose wages have been advanced this year by an amount of less than 2s. per week shall receive a war bonus of the difference between the amount of the advance per week and the sum of 2s.; (*d*) this resolution shall not extend to employees of the Education Committee, pensionable members of the police force and fire brigade, employees receiving board in addition to wages, employees with the Colours, employees whose wages have been or will be increased this year, except as provided by clause (*c*), and skilled employees who receive an equivalent provision as the result of a trade arrangement."

GAS PROFITS AT WARRINGTON.

The Rates and the Price of Gas.

The municipal budget was considered at a protracted meeting of the Warrington Town Council last Tuesday week; an increase in the rates for the ensuing financial year of 1s. 4d. in the pound being foreshadowed. This will bring the total to 9s. 4d. in the pound.

Mr. WILKINSON (the Chairman of the Finance Committee), in presenting the budget for the coming year, said he felt he had a task of serious importance. During the past three years, it had been his privilege and pleasure to introduce estimates showing no increases in the local rates; but now the position had materially changed, and the call upon the ratepayers was for £107,705, as against £89,631—an increase of £18,074, which it was proposed to meet by increasing the rates from 8s. to 9s. 4d. in the pound. As to the requirements for the ensuing year, many additional items had had to be taken into account, among which were the increased cost of labour due to advances granted by the Council during the year, the increase of income-tax, the increased cost of cartage, the payments to dependants of employees serving with the military forces, the war bonus to workmen, and the growing expenditure on education. It was not, however, solely in connection with the expenditure side that there was difficulty. The loss of income was one of the principal troubles to be faced. In the estimates for the current year there were included £1000 from the electricity department, £500 from the water-works, and £13,000 from the gas-works, or a total of £14,500 from these undertakings. It was estimated this year that the receipts from them would only be £5000, a

serious decrease of £9500. The electricity department was again providing £1000; the water department was not making a contribution; the gas-works contribution was to be £4000, as against £13,000. It should be noted, however, that during the current year the amount received from the gas-works was only £11,551. The difference of £1449 represented the surplus profits of 1912-13 received in relief of rates in 1913-14, so as to make the average contribution for the two years £13,000 as estimated. The dominating influences were undoubtedly the diminution in the profits of the gas-works and the considerable increase in the call for education. The profits from the gas-works for the past three years had averaged £13,145 per annum; while the different sums handed over in relief of rates for the three years had amounted to £42,868, being an average of £14,289 per annum. It would be realized how much they had in late years relied upon this source for funds to provide them with the ways and means for completing the many improvements which they had recently carried through; and now that they could not, for the first time, rely upon large gas profits, the immediate result was a heavily increased call upon the rates.

Mr. PEMBERTON said many people were anxious that the water-works should be acquired; and yet during the whole of his connection with the Council he had only known one £500 allocated to the rates from this source, while the water charges were among the highest in England. When the water-works belonged to a private Company, they paid 6 per cent. dividend. It was said that even a worm would turn; but he wondered what would make the ratepayers of Warrington turn. He wondered where all the money went. They had sown the wind; and they would reap the whirlwind.

Alderman BENNETT remarked that he had continually argued in favour of getting considerable profits from municipal undertakings such as gas, water, and electricity. He had always thought it a mistaken policy, having regard to the projects the Council had to face, to be continually calling out for reductions in the price of gas. Low rates were much more important to a town like Warrington than cheap gas, particularly in the minds of those who wished to introduce new industries. They could not eat their cake and have it. It would be easy to make large dividends on the municipal undertakings, if they cared to exploit the public to the utmost extent, both with regard to the quality of the supplies and the charges made for them. But the policy of the Corporation had been to afford the best facilities at a reasonable rate. His own view was that they ought to strike a happy medium; but at the same time, they should be able to put by considerable sums to provide against such a heavy advance in the rates. A point which advocates of private enterprise seemed to overlook was that none of the great limited companies had to pay off their capital by a series of fixed annual instalments; but the Corporation were obliged to do this before contributions in relief of rates could be made.

Mr. ROBERTS pointed out that twelve months ago a number of members of the Gas Committee resisted, but unsuccessfully, the final attempt which was made to reduce the price of gas. There was an inequitable side to gas reductions, of which the Council needed to be continually reminded. The limits of supply extended considerably outside the borough; and thus reductions were accorded to persons who were not ratepayers. These people got the benefit, in this way, of an undertaking solely financed by the ratepayers of Warrington, without responsibilities or contributions to the rates. He was afraid the Council might have to sanction an increase in the price of gas.

Mr. OSBORNE asked why the Council did not face the facts with regard to the contribution from the gas undertaking. If they wanted the gas consumer to pay the rates, why did they not say so? Most of the consumers were resident in the borough. They were, for the most part, either the industrial users of power gas, which was supplied at very little above cost price, or the occupants of the thousands of small homes which could not afford electric light, or where gas was used for cooking purposes, often through the penny-in-the-slot meter. Were these people to be taxed, in order to make the rates lower for the more opulent ratepayers or for the shareholders of limited companies, who might live out of town? If so, let the Council face the matter fairly and squarely, and raise the price of gas. But if they took this course, why not also increase the charges for electricity and water, and the tram fares, until they got all the money they needed for the rates from the profit-earning departments? It seemed to him that it was not what the various undertakings were producing which had caused the heavier rates, but the abnormal expenditure they had been called upon to face. He was one of those who advocated cheap gas, because he believed that to supply commodities at the cheapest possible price was the only equitable way in municipal government. The more money they derived from the gas concern, the more extravagance there would be in other departments. Personally, he was rather glad they had to meet the facts in this way. So long as they could get from £14,000 to £18,000 from profit-making departments, they were not going to be particularly careful as to expenditure in other directions. If the rates could only be kept down by charging abnormal prices for commodities, such a method would be a reflection upon the integrity and honour of any representative of the municipality. It was unfair that no reference should be made to the way in which the gas department had been handicapped by abnormal conditions.

Mr. HAWTHORN also said it should be remembered that they were paying more for fuel, more for labour, and they were getting less for their residuals than they would in normal times. They had taken too much out of the gas profits in relief of the rates.

Alderman TINNION expressed the opinion that the expenditure of the borough was not carried on in a reckless way, and that the Warrington ratepayer was getting good value for his money. They would lose on the gas undertaking from £8000 to £10,000 next year, if they continued to charge the same price for gas.

Mr. WILKINSON, in reply, pointed out that the estimates of all Committees were practically the same as they were last year. They had not increased. The fault, he said, lay in the fact that they were *minus* £9000 from the Gas Department, and had to find £3000 more for education. The difference in the wages of the men who had gone to the front was £3500; and they were thinking of giving all the workmen a war bonus while the war lasted, on account of the high price of foodstuffs, which was estimated to cost another £1000. This would make nearly £17,000. There was no wilful waste of public money.

Resolutions approving of the rates proposed were then carried.

WALSALL EXTENSION SCHEME POSTPONED.

The Walsall Gas Committee have had under consideration for some time past the desirability of reconstructing certain of the retorts at the works; and drawings, specifications, and tenders have been obtained from two firms making vertical retorts—one of whom has installed a plant at the Leicester Gas-Works, and the other at the Windsor Street Works, Birmingham. From inquiries which have been made, both of these plants have produced the results claimed for them.

After careful investigation, the Committee arrived at the conclusion that the Woodall-Duckham system was the most suitable for installation at Walsall. Accordingly, negotiations took place with the Woodall-Duckham Vertical Retort and Coke-Oven Construction Company, who guaranteed that the proposed installation should be put in and the work completed by the end of November next, provided the order was given without further delay. The firm tendered for five sets of four retorts, carbonizing 100 tons of coal per day, and producing 1¼ million cubic feet of gas. Including the removal of all material and the utilization of the present roof in No. 1 retort-house, and also the provision of an electrically driven plant (with generating plant), the tender amounted to £19,845. The Committee recommended the Council to accept this offer; the cost to be paid out of the gas-works reserve fund so far as the fund was available for the purpose, and the balance out of revenue over a period of five years. In the event of the Council agreeing to this, the Committee proposed to utilize only one-half of No. 1 retort-house for the new retorts—retaining the whole of the present machinery in the house for working the remaining horizontal retorts.

When the Committee's proposals came before the Town Council last Tuesday, it was explained that the question had been before the General Purposes Committee, who referred it to the Finance Committee, and the latter requested the Gas Committee to consider if it were not possible to defer the outlay for at least twelve months. The Committee were, however, advised that the need for the new plant was extremely urgent, as there had been occasions when it had been necessary to have practically the whole of the existing carbonizing plant in use, and a greater margin was required to avoid serious risk of a breakdown in the supply. The Committee, on making inquiries, were told that the postponement of the work would mean an increase in the contract price; and they were satisfied that the new plant would save the undertaking from £3000 to £4000 per annum.

However, the proposal for the adoption of the Committee's report was met by an amendment to the effect that consideration of the question be deferred for twelve months, in view of the existing financial exigencies; and this was carried by nineteen votes to nine.

NOTTINGHAM GAS UNDERTAKING AND COAL SUPPLY.

Alderman A. Ball, the Chairman of the Nottingham Corporation Gas Committee, who formed one of the recent deputation to Mr. Runciman on the subject of coal supply, has, in a subsequent interview with a Press representative, pointed out that although Nottingham is not in such immediate difficulty as many other centres, yet if the present state of things continues it must prove a serious business for everybody. "Were we to buy coal at even the lowest price now being asked, it would," he explained, "mean an additional expenditure of £50,000 a year on our bill. The collieries are asking from 5s. to 7s. advance on contracts forward; and it may be calculated roughly that 1s. per ton on coal means 1d. per 1000 cubic feet on the price of gas. Unless there is some increase of supply, the position will be even more serious next winter. Not only have a great many miners joined the Colours, but the trouble is much accentuated by the shortage of waggons. In Nottingham we are not so badly off as most places, as we have got just over a year's requirements bought and in stock; but we cannot obtain deliveries, and are now using our stocks up fast. As to the future price of gas, the position speaks for itself, since we use nearly 200,000 tons of coal a year."

A Prospective Rise in Price at Lewes.—The report adopted at the meeting of the Lewes Gas Company stated that the revenue account for the past six months showed a profit of £1222. Out of an available balance of £7227, the Directors recommended dividends for the half year at the rate of 5 per cent. upon the original capital stock and 3½ per cent. upon the additional capital stock. The Chairman (Mr. M. S. Blaker) said that the Company were now confronted by a great increase in the cost of coal; and there was no doubt that the price of gas would have to be raised. It appeared that they would have to pay practically 10s. per ton more for coal, as the port of Newhaven was practically closed to commercial traffic, and they had to get their supplies by rail. More gas had been sold, largely owing to the military in the town. Thus the Company's resources had been somewhat strained; and it was under contemplation to put down a boosting plant and a carburetted water-gas installation. Twelve of the employees had gone to the war.

Cost of Generating Electricity.—At the March meeting of the Southport Town Council, upon the minutes of the Gas Committee being moved for adoption by Mr. Richardson (the Chairman), Mr. Billington drew attention to an item in the accounts of £90 for a generator. He said he was only seeking information; but if the expenditure meant what he suspected, he thought it ridiculous that they should go to this expense. They had an electricity works which could generate electricity, and a building advertising the use of electrical appliances; and it did look ridiculous that one of their own Committees should go directly opposite to what they advised the public. Mr. Richardson, in reply, said this was a question that came before the Council a few months ago. The generator had been installed some time. The Gas Committee did approach the Electricity Committee with regard to the supply of current; but they could not come to terms. The Electricity Committee asked 1½d. per unit; but when the Gas Committee went into the question of generating electricity, they found that they were able to do it at less than ½d. per unit.

COKE BREEZE FOR ELECTRIC GENERATING STATIONS.

Experiences in London.

In the course of the proceedings at the annual meeting of the South Metropolitan Electric Light and Power Company, Limited, reference was made to the use of coke breeze for the production of power.

Mr. H. W. Bowden (the Company's Engineer-in-Chief), after referring to the satisfactory results obtained with the last new turbine plant, stated that important work had been carried out during the last few months in their efforts to burn inferior fuel—coke breeze, which could be obtained quite cheaply, owing to the power-house adjoining the gas-works. After inspecting several boilers on the Continent burning coke breeze successfully, a contract was entered into with the gas company for the supply of breeze, and the apparatus placed on order to make a trial on one boiler. The results obtained (though by no means complete) had justified the trial and the arrangements then made. The boiler on test had been working almost continuously for the past few weeks on coke breeze unassisted by coal, producing practically the full output of the boiler. The saving in fuel was considerable; and if the results could be ensured without additional expense in repairs and attendance, the Company's costs of generation should in normal times show a marked improvement when further boilers had been equipped. So far as he was aware, it was the first power-house installation in this country where mechanical stokers had been fitted and coke breeze burned successfully for several weeks together, unassisted by coal, without letting the fires down. He had on several occasions emphasized the importance of securing low generating costs, owing to the increasing demand made for power at very low rates. He ventured to think they had, in a measure, been successful in their recognition of this fact; and thanks were due to the power-house staff for the assiduous attention given in their endeavours to obtain this end—resulting in a reduced coal bill of approximately £900 for practically the same output as the preceding year.

Mr. Horace Boot said he should like to know the price at which Mr. Bowden bought the coke breeze, because he himself went very fully into the question in regard to some large works. At that time the breeze was offered at 6s. a ton; and recently the price had gone up to 8s. 0½d. Mr. Bowden spoke of the same output with the breeze; but his (Mr. Boot's) experience of using it and trying to get the same output was that it meant reducing the life of the boiler by one-half.

In connection with this subject, the following letter, by the Engineer and Fuel Expert of the London Coke Committee, appeared on Friday last in the "Electrical Review," from which the preceding remarks were taken.

In the interests of my Committee, may I be allowed to correct an impression which might be conveyed by the remarks made in reference to the above subject by Mr. Horace Boot, as reported in your last issue, at the annual meeting of the South Metropolitan Electric Light and Power Company, Limited.

In discussing the policy of the Company in adopting coke fuel for steam-raising, and the favourable report of Mr. H. W. Bowden (the Engineer-in-Chief), on his experiments in this direction, Mr. Boot is reported to have said that the price of coke breeze had risen from 6s. to 8s. per ton, and that in his experience the use of this fuel would have reduced by one-half the life of certain steam-boilers with which he had experimented. It would be interesting to many users of this class of fuel to know the precise conditions of Mr. Boot's experiments, as it is within the knowledge of a large number of engineers that steam-boilers of most types common to this country are operating satisfactorily on coke breeze, and also that there are many instances where no other class of fuel has been used; and this without the baneful results indicated, and without adverse comment being received from inspectors employed by the leading Boiler Insurance Companies.

One concrete instance may be given which will be appreciated by engineers responsible for the maintenance of boiler plant operating on coal slack containing the usual proportion of volatile sulphur. In evidence recently given before the Departmental Committee on Coal Smoke Abatement, Mr. Edward Allen, Chief Engineer of the Liverpool Gas Company, stated that in his experience Babcock water-tube boilers had been fired with coke fuel over a period of fifteen years without the necessity arising of renewing a single tube. Similar experience with most types of boilers at colliery, coke-oven, and other works where the use of raw coal is not permitted (and where boiler capacity is not an unimportant consideration) could be quoted *ad infinitum*. These boilers are almost invariably operated under impelled-draught conditions at their full normal capacity.

The increase in price reported by Mr. Boot is entirely due to conditions brought about by the war, and, unfortunately, is common to all classes of solid fuel, and to a greater extent in the case of coal. But, even at the higher figure indicated, coke breeze is still the best fuel value at present obtainable in London. Makers of furnace apparatus will guarantee an evaporation of 6 lbs. of water per pound of breeze, and rates of combustion exceeding 30 lbs. per square foot of grate per hour have been maintained with automatic mechanical stokers of the underfeed travelling-grate type, illustrated and fully described in the "Journal of Gas Lighting" for July 28, 1914.

Mr. Bowden is probably correct in stating that his is the first power-house stoking equipment specially installed in this country to use coke breeze exclusively, and his achievement in continuous operation is certainly unique. But many of the more up-to-date power stations, the stoking appliances of which do not restrict them to the use of one uniform class of coal, are now using coke breeze extensively, while others are using coke to the total exclusion of all other solid fuel for steam-raising; thus realizing considerable commercial advantage in addition to the practical advantage of smokeless combustion.

As a matter of local interest, it may be worthy of note that coke is now produced in the London district to the extent of over 2 million tons annually. In normal circumstances, a large proportion of this output is exported at a price considerably below that at which coal of equal evaporative value can be bought in London.

AMMONIA PLANT FOR RUSSIAN GAS-WORKS.

Writing from Petrograd early in the present year, a correspondent of the "American Gas Light Journal" made the following remarks on the bye-products question in Russia—a matter which was referred to in the "War Notes" in the "Journal" for the 26th of January.

Under stress of shortage of supply of raw material for the colour industry, the Russian chemical industrialists are turning their attention with more earnestness than ever before to the possibilities of home supplies. The coal tar item, being of exceeding importance, is receiving particular attention; and though in the South, at the coking-ovens of the Donetz basin, large quantities are made in the process of producing coke for several extensive Russian metallurgical works, it is felt that the gas-works that exist in Russia have not turned theirs to as good account as might have been the case. For example, it is only at the Warsaw Gas-Works that any serious effort has hitherto been made to recover for colour-making purposes the bye-products of gasification, and there considerable quantities of coal tar are saved for use in the chemical works, &c. As the Warsaw Gas-Works, which, by the way, belong to a German combination, turn out something like one-third of the total coal gas produced in Russia, it may be said that, so far as the gas-works in the country are concerned, the coal-tar recovery problem is solved to the extent of only one-third.

But there are other large gas-works where economy of bye-products is sadly in want of attention, both at Petrograd and Moscow. At the latter works, however, a contract was entered into shortly before the beginning of the war for laying down an ammonia-recovery plant and other equipment for utilizing what was once waste. Unfortunately, the war has interfered with the execution of the contract, which, in the circumstances, must remain either inoperative while the war lasts or must be cancelled in favour of contractors either in Russia or some friendly or neutral country. One Russian chemical engineering house was willing to undertake the work; but it does not appear yet to have been put in hand. There was a feeling, it is said, that loyalty to the contract with the German engineers constrained the Moscow authorities to decline this assistance. But the latest news is the fact that the delicacy in respect to the contract with the Germans is being overcome, and that either home houses or some house belonging to a friendly country will have the work to do; for it is recognized as an item of great importance in the Moscow Gas-Works economy.

There are altogether only some twenty gas plants in Russia, and as the Warsaw works supply about one-third of the total, if we except the works of Petrograd and Moscow, we find the remaining seventeen are relatively small concerns. Warsaw's delivery of gas is 36 million cubic metres (1271½ million cubic feet) per annum, that of Moscow 13 millions (459 million cubic feet), and that of Petrograd 19 millions (671 million cubic feet). Totalling these three, there is a very small margin to be divided among the seventeen others.

PETROGRAD AND MOSCOW GAS SUPPLY.

According to a report on the Petrograd Gas-Works just issued, gas is the principal illuminating agent in the city. This is shown by the distribution of the various systems of lighting, as follows: In 1913 there were 2894 electric lamps, 1054 kerosene lamps, 3109 kerosene incandescent lamps, and 8766 gas-lamps. The illumination of Petrograd cost 911,000 roubles (£96,794) in all. Electric lighting accounts for 22·8 per cent., kerosene lighting for 28·5 per cent, and gas lighting for 45 per cent. In the year 1909 the Municipality began to carry on the works the city had acquired on the Obvod Canal and the Vassilievsky Island. The length of the gas-mains in Petrograd for street lighting is 285 versts (a verst equals 1166 yards), compared with 286 versts in Moscow. The price of 1000 cubic feet of gas in Petrograd is 1 rouble 60 copecks (3s. 4½d.). It is 1 r. 70 c. (3s. 7d.) in Moscow. Although the Petrograd works yield a profit of 122,000 roubles in the year, the Moscow works show a deficit of 145,000 roubles. Moscow has spent a large amount in improving its gas-works; and Petrograd is about to incur a corresponding expenditure. It is felt that unless great caution be exercised in taking this step, the profit may be converted into a deficit. A serious feature is the loss of gas by leakage, which in Petrograd is 14 per cent. of the total quantity produced, representing a loss of 95,000 roubles a year. The report referred to at the outset states that gas must be cheapened in order to increase the consumption.

STATUS OF THE GAS INDUSTRY IN JAPAN.

Progress in 1914—Forecast for 1915.

In the first article in the current number of the "Journal of the Imperial Gas Association of Japan," the Editor (Mr. S. Inubushi) deals with the progress made in the gas industry of the country last year, and gives a forecast for the current year. While, he says, no one can dispute the fact that the industry has been suffering from the general depression throughout business circles, it must not be taken for granted that its status at present is such that former conditions cannot be revived. Such revivals have been experienced in the past, and will be again. This, he considers, holds particularly good in the existing situation of the gas industry. The year 1913 witnessed a number of amalgamations between local gas companies—an innovation that proved profitable in many ways. Instigated by the success of these amalgamations, the same business methods were adopted in not a few instances between gas and electricity companies last year. This, Mr. Inubushi considers, "was the natural outcome of the awakening to the fact that it is far better for the lighting industries, as represented by both gas and electricity, to do away with the ceaseless fighting for industrial supremacy through competition, and to join their interests to their mutual benefit." Having noticed the most important of these amalgamations, the writer remarks that while 1913 might be said to

represent a year of adjustment of the gas companies within themselves, 1914 represented the "harmonious rearrangement of the gas and electric light companies." Mr. Inubushi's subsequent remarks may be reproduced practically as they stand:

> All things change with the passing of time, and it fell to the lot of the smaller towns to reap the benefit of the adjustment of the business that took place in the larger cities in the previous year. In this matter, we are pleased to see the fulfilment of our forecast made last year. At the beginning of 1914, the gas companies were 83; and by the end of the year, companies were established which brought the number up to 93. Eight other gas companies—four begun last year, and the remainder launched in previous years but not yet prepared to commence business—are not included in the number of companies being operated at present. If these companies are included, we bring up the number to 101. The authorized capital of the ten companies which began operating last year is 1,375,000 yen; the paid-up capital, 535,000 yen; and that for the eight companies not yet in operation is 1,550,000 yen, of which 387,500 yen is paid up.
>
> Thus far we have spoken merely of outward development; but the inward development, or that of the management of the companies, must not be overlooked. The smaller companies have been more or less influenced by the innovations undertaken in the management of the largest Tokyo Gas Company; and the exhibition and demonstration of cooking by gas held by this Company have been tried by some of the smaller ones—thus contributing greatly to their success and to that of the industry in general.
>
> The present European War has, to our regret, retarded further development to no small extent; and there is fear that the supply of indispensable materials may be cut off. This condition may retard importation of plants for newly organized companies, and interfere with further promotion and construction. If this fear is realized, it cannot help interfering with any marked progress that otherwise might have been made in the gas industry. However, "It is an ill wind that blows no one any good;" and these same difficulties may, in the end, prove of valuable service to the industry throughout the country, in that it will compel us to manufacture our own chemicals and gas appliances, hitherto imported.

The Increased Cost of Living.—At Wednesday's meeting of the Southport Town Council, application was made for an increase in wages for workmen in all departments "except that of the collectors for slot-meters." "We are compelled to make this application," the letter read, "owing to the enormous increase in the cost of commodities. . . According to the Board of Trade returns, August, 1914, to January, 1915, the increased cost of living was 19 per cent., or approximately 4s. in the pound. Since January there has been a further increase of 5 per cent., making 5s. in the pound."

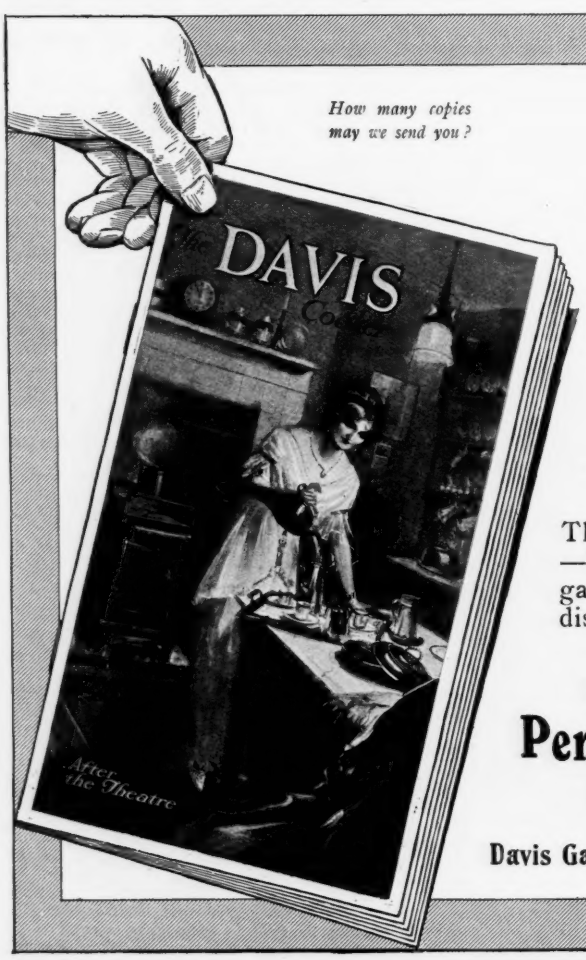
SHEFFIELD WATER-WORKS AT EWDEN.

A Model Village and Recreation Hall.

The members of the Water Committee of the Sheffield Corporation, accompanied by the Lord Mayor (Councillor O. C. Wilson), the Lady Mayoress, and the leading officials, recently visited the Ewden Valley, for the purpose of formally opening the recreation hall in the model village which is in the centre of the works now in progress for the construction of two large reservoirs in connection with the additional water supply for the city. They will be known as the Broomhead reservoir, with an area of 115 acres and a capacity of 1050 million gallons, and the Moor Hall reservoir, with an area of 70 acres and a capacity of 562 million gallons. The two reservoirs will provide a daily supply of 7,249,536 gallons, of which 4,620,163 gallons will be available for the city and district. The estimated cost of the works is £805,200; and the Chief Engineer-in-Charge is Mr. Colin Clegg. The constructional work is being carried out directly under the administration of the Municipality.

The occasion afforded the visitors an opportunity of going over the village, which has been laid out for the accommodation of the workmen and their families. There are two classes of roomy bungalows, fitted with baths and hot and cold water, and lighted by electricity. They are constructed of timber, with a red roof of asbestos tiling. The village has a general store and a canteen; one department of the latter being specially fitted and used as a café for the sale of non-intoxicants. A mission hall will shortly be completed. In the centre of the village is the recreation hall, a building 90 ft. by 30 ft., which will be open every day from 8 a.m. till 10 p.m. It is already well equipped with two billiard-tables and writing and reading tables and newspapers; and it is hoped shortly to establish a good lending library. The room will be kept bright and attractive, and it is hoped will be made the centre of useful activity and be thoroughly appreciated by the men. The number at present employed is 207; but there will be from 700 to 800 when both reservoirs are in hand.

The opening ceremony was performed by Alderman Styring, the Chairman of the Water Committee, who unlocked the door of the hall with a handsome silver key presented to him by his fellow-members. When the company were inside the hall, he dwelt on the previous water undertakings carried out by the Corporation, and on the success of the administration method, which they had again adopted in preference to letting the work by contract. One advantage was, he said, that they secured works of a perfectly satisfactory and durable character; and another that they were able to secure the welfare of those who were engaged upon the undertaking. In the latter respect, Sheffield had done much pioneer work, and now Parliament made proper provision for the men compulsory. He touched on the necessity for a canteen on such an undertaking; but he told the men that



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the more time they spent in the recreation-room and the less in the canteen, the better it would be for them.

A vote of thanks was accorded to Alderman Styring; and the Mayor was thanked for his presence in the chair. Mr. William Terrey (the General Manager of the Corporation water undertaking), who designed the place and the buildings, and has given direct personal attention to making the village a model of its kind, was warmly praised.

TYNEMOUTH AND MORPETH WATER SUPPLY DISPUTE.

At the Surveyors' Institution, last Friday, Mr. A. J. Ram, K.C., sat as arbitrator to settle a dispute between the Tynemouth and the Morpeth Corporations in regard to a water supply agreement.

The Hon. J. D. Fitzgerald, K.C., and Mr. Lowenthal appeared for the Morpeth Corporation; Mr. Holman Gregory, K.C., and Mr. Scholefield represented the Tynemouth Corporation.

Mr. Holman Gregory, in opening the proceedings, said the dispute arose in regard to the terms of an agreement entered into on July 25, 1903, under which the Tynemouth Corporation agreed to supply water in bulk to the Morpeth Corporation from the gravitation mains running from the Font reservoir to Tynemouth. The dispute between the parties was in respect of the manner in which water was to be supplied. Morpeth was a town of between 8000 and 9000 inhabitants, 14 miles north of Newcastle, and 20 miles north-west of Tynemouth. Morpeth had its own water undertaking, which was not considered sufficient to comply with a margin of safety. The Tynemouth Corporation had three sources of supply at Tranwell, with a storage reservoir of 12½ million gallons, 270 feet above Ordnance Datum. The ground-levels of Morpeth ranged from 84 to 196 feet above sea-level. After the Tynemouth Corporation had purchased the undertaking, they obtained power in 1898 to take water from the River Font, 30 miles away from Tynemouth, to construct a reservoir 611 feet high and through gravitation mains to supply water in bulk to any councils within 10 miles of the main. In 1904, the Newcastle and Gateshead Corporations had a Bill before Parliament, and proposed to supply councils who were on the line of the gravitation main of Tynemouth, and within the 10-mile limit. As a result of negotiations, Morpeth and other councils within the area of supply entered into an agreement to take an optional supply from the Tynemouth Corporation, and also oppose the Bill. The Morpeth Corporation petitioned against the Bill; and though it was eventually sanctioned by the House of Lords, it did not affect the district. The agreement in question provided that the Morpeth Corporation should take water from the gravitation main of the Tynemouth Corporation at Morpeth Common; Tynemouth to make a communication, and supply a suitable meter-house at the cost of Morpeth. At a later stage Morpeth requested a supply of water, but refused to allow them to make their own communication, and said they must build a small tank at a spot 200 feet high. In other words, they were to rob the Tynemouth Corporation of one of the chief merits of their water—the pressure obtained by reason of the water coming down from the reservoir station 600 feet above Ordnance Datum. The Tynemouth Corporation considered the proposal absurd.

Mr. Fitzgerald said a question of law was likely to arise on the construction of the agreement; and he intended to ask the Arbitrator to state his award in the form of a special case.

Mr. Holman Gregory thought it rather a pity to add to the expense and trouble of an arbitration.

The Arbitrator said the final determination was left to him; but this did not preclude him from stating a case, and he would settle the procedure later.

Mr. Fitzgerald contended that the Tynemouth Corporation's plan was most objectionable, and not what the agreement provided for.

Mr. Holman Gregory read correspondence whereby the two engineers agreed that the connection was to be a direct one. Some question arose respecting the notice to be given before connection; and the matter dropped until 1913, when it was again revived.

After a long legal argument, the proceedings closed; and the Arbitrator announced that he would give his decision in due course.

TRENT NAVIGATION SCHEME.

After a protracted inquiry, a Committee of the House of Commons (presided over by Mr. Mount) on Friday passed the preamble of the Nottingham Corporation Bill, dealing with the project for improving the navigation of the Trent between Newark and Nottingham, at an estimated cost of £160,000—authority being given to utilize the profits of the gas and other trading concerns of the city.

The ratepayers who had lodged a petition against the measure having failed to establish a *locus*, the opposition was limited to the three great competing Railway Companies serving the district—the Midland, Great Northern, and Great Central—whose contentions were successful upon a very salient point; the Committee refusing to grant the Corporation powers as common carriers. The measure, therefore, as it stands is of doubtful financial value to the Corporation, though for the purpose in view the mortgaging of the funds of the gas undertaking, to which considerable objection has been raised locally, may be resorted to.

As far as it goes, the Bill simply gives power, upon condition that the work is not started until after the conclusion of the war, for the Corporation to enter into agreement with the Trent Navigation Company and raise money for carrying out the scheme, which, it was suggested, might very well have been financed by shareholders in the Company themselves, had they such faith in the enterprise as has been represented. In any circumstances, it is possible that the gas exchequer stands in danger of being laid under heavy contribution for an undertaking which is admittedly dependent for its success upon a problematically large increase of the Company's present revenue.

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NOTES FROM SCOTLAND.

From Our Own Correspondents.

Saturday.

On Tuesday night the Lighting Department of the Glasgow Corporation inaugurated a scheme for a reduction in lighting, which will be continued until the supplies of coal at the gas-works are at the normal quantities. Notwithstanding the restricted lighting of the city, there is still ample illumination. Only alternate gas-lamps are lighted; and the electric lamps are not affected. Even with the reduced light, the streets are in a condition of brightness which would be envied by the inhabitants of those cities and towns which have been compulsorily darkened by Government orders.

At a meeting of the Paisley Gas Commissioners on Tuesday, a report was submitted by the Corporation Gas Engineer and Manager (Mr. G. R. Hislop) with reference to the price of coal recently purchased for the gas-works. Offers for 1700 tons had been accepted from various contractors, the total cost of which was £1846 5s. The purchase, owing to existing exceptional circumstances, was a special one. The average price was 21s. 8d. per ton, compared with 13s. 1d. for the current year's purchase; being an excess of 8s. 7d. per ton, or equal to £733 on the 1700 tons purchased. A letter was afterwards read from the Town Clerk of Glasgow, together with a copy of a letter to the Prime Minister, regarding the delivery of coal; and the Council were asked to approve of the motion which had been adopted at a meeting of representatives of Corporations and Gas Commissioners that the Government should be approached to put into operation section 4 of the Coal Mines Act, 1908. The Council approved of the motion.

The stokers at the Inverness Gas-Works having demanded an increase in their wages, a war bonus of 2s. per week was offered to them. This, however, they refused to accept. At present the leading stokers receive 5s. 3d. per shift of eight hours, or 37s. per week of 56 hours. Their demand was for 1d. extra per hour, with ½d. extra for Sunday, which would make their weekly wage 44s. 3d. Other stokers receive 4s. 4d. per shift of eight hours and time-and-a-half on Sundays, which is equal to 33s. 8d. per week of 56 hours. They demanded 1d. per hour extra, with a continuance of half-pay extra on Sundays, which would equal 37s. 6d. per week of 56 hours. A special meeting of the Town Council was held on Thursday to consider what steps should be taken in the matter. It was formally reported that the men had refused to withdraw the ultimatum to cease work at 2 p.m. on Monday. The Gas Manager (Mr. A. Thompson) said that he had made inquiries and found that of 18 stokers five would not accept the bonus offered. Two were determined to strike; but the other three would, it was understood, be agreeable to accept a weekly bonus of 2s. 6d. during the period of the war. Even if these five men determined to strike, their places could be filled by yardsmen. The Council instructed a deputation, along with the Gas Manager, to meet the men and submit an offer of a 2s. 6d. bonus.

At a meeting of the Gas Committee of the Dunfermline Corporation this week, the request by the gas-works employees for an increase in wages (2d. per hour) was considered, and it was agreed to make the men an offer of 2s. in the week.

There is some dissatisfaction with the public lighting at Rothesay. It is at present electric, and one of the councillors gave notice that, at a forthcoming meeting of the Town Council, he would move that gas lighting should be substituted. It was eventually decided, however, that the matter should be referred to one of the Committees.

Coal has been purchased for the Paisley Gas-Works at an average price of 21s. 8d. per ton, compared with 13s. 1d. for the current year's purchase—being an excess of 8s. 7d. The purchase is 1700 tons.

The first annual meeting of the Kilmaurs Gas Company has lately been held. The trading account and balance-sheet for the year ending the 31st of October last were considered; and, after full explanations of the different items in the accounts, they were adopted unanimously in all details, including the recommendation of the Directors that a dividend of 4 per cent., free of income-tax, should be paid. It was pointed out by the Chairman that had revenue been charged only with its due share of expenses, and had less generous allowances been made for depreciation, &c., the dividend would have been about 15 per cent. The shareholders approved of the Directors' policy of laying a sound foundation early in the Company's career; and all the members of the Board were re-elected.

In accordance with the announcement in last week's "Notes," a lecture on "The Gas-Heated Circulating Boiler and its Application to the Domestic Hot-Water Apparatus" was delivered in the Leith Walk School, Edinburgh, on Thursday night, by Mr. Frederick Dye, under the auspices of the Edinburgh and Leith Gas Commissioners. Mr. Alexander Masterton, the Engineer and Manager to the Commissioners, presided over a large audience, and introduced the lecturer. Mr. Dye at the outset discussed the question of the cost of heating water by gas, and mentioned that the actual figure for supplying a bath of warm water was 1½d. For cleaning-up purposes, two panfuls of hot water could be obtained for ½d. each. This, he declared, proved that the cost was no bar to the adoption of gas for domestic purposes. It would be fatal to the boiler without control of the gas; and this was secured automatically by the heating of the water. There were few idle hours for the kitchen boiler; and without this automatic control there would be waste. He described two types of boiler—one adapted for business premises and the other for household use. The latter was made so that it could be connected with the pipes already in the house. He concluded with a demonstration of practical detail, and received a cordial vote of thanks for his lecture.

Messrs. Stewarts and Lloyds have decided, after setting aside £100,000 for depreciation, to recommend dividends of 6 per cent. on the preference shares, 10 per cent. on the preferred shares, and 2s. each (making 2s. 6d. for the year) on the preferred shares, for the six months to Dec. 31 last; to place £50,000 to the reserve fund; and to carry forward £97,000.

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CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *March* 15.

The market for pitch remains practically without change. There is business to be done if freight were obtainable, but, even at the present exorbitant rates, few boats are offering. A letter in last week's issue of the "JOURNAL" mentioned the selling price of pitch in Manchester as 17s. per ton. But in the London market, even on buyers' ideas, 22s. 6d. is the value, and sellers are unwilling to go below 23s. Sixties crude carbolic acid is firm at 3s. 3d. per gallon net, casks free. Creosote is $4\frac{1}{16}$d. to $4\frac{1}{8}$d., net and naked at makers' works. Pyridine is not in great demand; but the value is still called 8s. 3d. per gallon, in buyers' packages. Benzol for motor purposes remains steady at 1s. 2d. per gallon net at makers' works. Solvent naphtha, 90-160, is scarce and continues to improve in value; the present price being 1s. 8d. per gallon net in returnable casks.

There is no change to report in sulphate of ammonia; the value for 25 per cent. quality remaining firm at £13 12s. 6d. per ton net, at makers' works, into buyers' bags. The forward position is well supported at all ports.

Tar Products in the Provinces.

March 15.

The markets for tar products have remained rather steady throughout the past week. There is a fair amount of inquiry for benzol. Solvent naphtha is very firm, and some improved prices have been paid. Heavy naphthas are in fair demand. Creosote is quiet, and sales are continually being made at reduced prices. Crude carbolic is firm, and improved prices have been paid throughout the past week.

The average values of gas-works products during the past week were: Tar, 22s. to 26s.; pitch, East Coast, 17s. to 17s. 6d.; West Coast, 17s. 6d. to 18s. 6d., Manchester; 18s. 6d. to 19s. 6d., Liverpool; 20s. to 20s. 6d. Clyde. Benzol, 90 per cent., naked, North, $9\frac{1}{2}$d. to $10\frac{1}{2}$d.; 50-90 per cent., naked, North, 1s. 3d. to 1s. 4d. Toluol, naked, North, 2s. 2d. to 2s. 4d. Crude naphtha, in bulk, North, $5\frac{1}{4}$d. to $5\frac{3}{4}$d. Solvent naphtha, naked, North, 1s. 4d. to 1s. 5d. Heavy naphtha, naked, North, 11d. to 1s. Creosote, in bulk, North, $3\frac{1}{2}$d. to $3\frac{3}{4}$d. Heavy oils, in bulk, 4d. to $4\frac{1}{2}$d. Carbolic acid, casks included, 60 per cent., East and West coasts, 3s. 3d. Naphthalene, £7 to £11; salts, 65s., bags included. Anthracene, "A" quality, 2d. per unit; "B," nominally $\frac{3}{4}$d.

*** In connection with the above report, attention may be specially directed to an article on a previous page in the current issue of the "JOURNAL" (p. 645). Our correspondent informs us that next week it is hoped to give the price referred to for the pitch portion of tar from August last to date,—ED. J.G.L.

Sulphate of Ammonia in the Provinces.

LIVERPOOL, *March* 13.

There is no new feature to comment upon in the market for this article, the tone having continued quiet all the week. The demand for home consumption has not been extensive, and the difficulties in railway transport and freight arrangements have still hindered the export trade. Quotations are unchanged since last report at £13 11s. 3d. per ton f.o.b. Hull, £13 12s. 6d. per ton f.o.b. Liverpool, and £14 2s. 6d. per ton f.o.b. Leith. There has been more interest shown in future delivery, and it has transpired that £13 to £13 2s. 6d. per ton f.o.b. good ports has been paid to makers for July-December in equal monthly quantities.

Nitrate of Soda.

This market is firmer, and spot prices have been advanced to 11s. 3d. per cwt. for ordinary, and 11s. 9d. for refined quality.

Sulphate of Ammonia.

From another source it is reported that this market has been very quiet during the past week; but on the whole prices have remained about the same. The difficulty in shipping is not helping the market in any way. Outside London, makes are quoted at £13; Hull, £13 12s. 6d. to £13 15s.; Leith, £13 17s. 6d.; Liverpool, £13 17s. 6d.; Middlesbrough £13 15s. to £13 17s. 6d.

COAL TRADE REPORT.

Northern Coal Trade.

The northern coal trade appears to have developed further strength; and as the shipments are heavier, the better demand has again forced-up prices. Steam coals show especially rising quotations, though much of the coal sent out is being sold at lower figures. In the gas coal trade, the demand is steady; but consumption is now decreasing, though stocks may need replenishing. Best Durham gas coals are now about 14s. 6d. per ton f.o.b.; second-class gas coals are 13s. 6d. to 13s. 9d. per ton; and "Wear Specials" are still in the neighbourhood of 14s. 6d. per ton f.o.b. It is believed that more contracts have been entered into for gas coals for the London Companies; but the prices are not officially stated as yet, and a good deal of the total quantity remains to be arranged for. It is worth note, as influencing the delivered price of coals, that the very high rate of freights has lately decidedly eased—the freight, Tyne to London, being now down to 10s. 6d. But the possibilities of the future are doubtful, both as to the coal and its sea carriage—the lengthening days having some effect. In the coke trade, the demand is fair. Gas coke is steady, with a rather better export; and good makes are 12s. to 12s. 9d. per ton f.o.b. in the Tyne.

John Wright and Eagle Range.

Mr. H. James Yates presided at the annual meeting of the shareholders of John Wright and Eagle Range, Limited, at Birmingham last Wednesday. In moving the adoption of the report [see "JOURNAL" last week, p. 615], he reminded the shareholders that for some years past they had been developing the section of their business concerned with the manufacture of all types of gas-furnace apparatus for use in factories. The potentialities of this business were enormous; but as yet comparatively few manufacturers realized how much they had to gain by installing this class of apparatus in their works and abandoning the old rule-of-thumb methods of annealing, hardening, and quenching of steel. A name that was well known in the gas-furnace world was that of Messrs. S. N. & E. R. Brayshaw, of Manchester, who had had greater experience of this class of work than anyone else in the country; and as it had always been the practice of John Wright and Eagle Range to secure the benefit of the best skill available, they had acquired the controlling interest in Messrs Brayshaw's business. The arrangements had been completed since the figures for last year were made up, and a new Company had been registered under the title of Brayshaw Furnaces and Tools. In the section devoted to the manufacture of furnaces they had been making for months past a large number of special gas-furnace for the annealing of shells and shell cases. They were particularly proud of the fact that the furnace was of their own design, and that they had thus been the means of helping to increase considerably the output of shells and cases. Mr. G. G. Brodie, who seconded the resolution, said the first seven months of the year were the best seven months the Company ever had, and but for the war they would have had still another record year. The report was adopted, and the retiring Directors (Mr. W. Brodie and Mr. J. F. Davies, the latter having succeeded Mr. S. Sanders during the year) were re-elected.

Leyland Water Supply.—A Local Government Board inquiry into an application to borrow £1283 for works of water supply by the Leyland Urban District Council has just been conducted at Leyland by Mr. F. H. Tulloch, M.Inst.C.E., one of the Board's Inspectors. The proposed works are for auxiliary mains to ensure for the higher reaches of the district an adequate supply of water. There will also be included the execution of works in the township of Clayton-le-Woods. The proposed mains are a 6-inch of 1 mile 4 furlongs 111 yards, and a 3-inch of 2 furlongs 190 yards. Mr. M. H. Wilkinson, the Surveyor, said the scheme had been brought about through complaints by the consumers in the higher districts that on Mondays, and occasionally on other days, when Thirlmere water was being used, especially in very fine weather, the supply would fail altogether for a few hours. This caused great inconvenience, besides being a risk in case of fire. It was considered that the 6-inch main would provide a complete circulation of water at all times. There was no opposition to the application.

Stretford Gas Company.

The report submitted at the recent half-yearly meeting of the Company stated that the balance-sheet showed a profit for the six months ended Dec. 31 of £7285. Adding to this the balance from last account (£1013) made the amount disposable £8298. The Directors deemed it necessary and prudent to write-down the investments of the Company to their present value; and they had therefore applied £968 to this purpose, thus reducing the amount disposable to £7330. The Directors recommended dividends at the rate of 10 per cent. per annum on £25,000 and 7½ per cent. per annum on £14,000 original £5 shares, of 7 per cent. per annum on £61,000 new "A" £10 shares, and of 5 per cent. per annum on £40,000 new "B" £10 shares. These would absorb £4910, leaving £2420 to be carried to next account. It was with the deepest regret that the Directors had to record the death of their colleague, Mr. W. Lewis Galloway. Since the year 1889, Mr. Galloway had been a member of the Board of Directors, and for fourteen years prior to 1911 had continuously held the position of Chairman, taking the warmest interest in the Company's affairs, and discharging the duties of the office in the manner which won the esteem of all with whom he was brought into contact. A donation of £50 had been given to the local branch of the Prince of Wales's Relief Fund. Special attention has been directed to the safety of the Company's works at Stretford. The premises had been lighted by night and guarded day and night at a considerable cost to the Company. Twenty-nine of the Company's staff have gone on active service; and following the example of corporations and other public bodies, the Company are treating their dependants liberally. The loss of these employees has somewhat inconvenienced the Company; but the remaining members of the staff have shown a most praiseworthy desire to meet the difficulties of the position. In addition to the £50 contributed by the Directors to the National Relief Fund, the staff and employees have given £100. The value of the free work done by the Company for Red Cross hospitals and refugee hostels, &c., with subscriptions, amounts to a further sum of about £240; and they have loaned over £250 worth of apparatus.

Increased Electricity Charges in Dublin.—The Dublin Corporation Electricity Supply Committee have decided to recommend an increase in charges of 1d. per unit all round for lighting and ½d. per unit for power. The further increase in the price of coal, with the increased cost of carbon, maintenance, materials, &c., has brought the estimated expenditure of the coming twelve months over the past twelve months to a figure of £37,500. The Committee hope to meet £10,000 of this; but the remaining £27,000 will have to be borne by the consumers. The proposed increases have evoked much adverse criticism, and great dissatisfaction is expressed. By order of the Electricity Committee, the number of street lamps lighted is now reduced from 600 to 300 after 10.30 p.m.; the object being to economize the consumption of carbons, the supply of which has been interfered with by war conditions.

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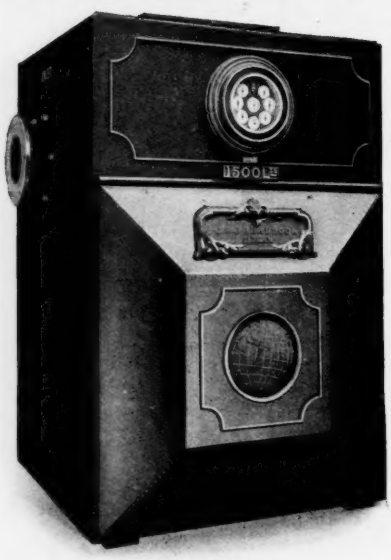

No. 219. Braddock's Large Dry Meter.

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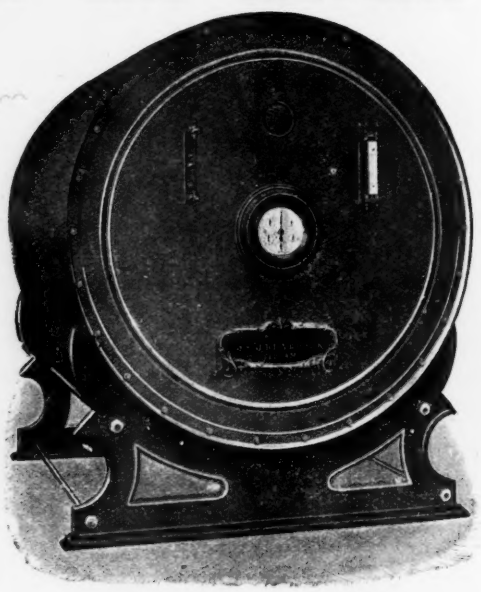

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Winchester Water and Gas Company.

In the report which was presented at the recent meeting of the Company, the Directors stated that, for the half year ended Dec. 31, the receipts from the sale of water and gas showed a considerable increase, due principally to the special supplies to the Military Authorities. These supplies were obviously of a temporary nature, and must not be considered as a permanent addition to the Company's revenue. The balance of net revenue account available for dividend was £10,327; and the Directors recommended the payment of a dividend on the preference stock at the rate of 4 per cent. per annum, and on the consolidated ordinary stock at the rate of 4¼ per cent. per annum (less income-tax). During the half year, very great difficulties had been experienced in obtaining coal and other supplies. The larger portion of the Company's coal was seaborne from Durham to Southampton; and in the earlier part of the six months these deliveries were much delayed, and later ceased altogether. The Directors had been able to buy other coal for delivery by rail at reasonable prices; and this coal was received with fair regularity. The tonnage which the Company were able to secure had now been nearly all delivered; and the further necessary coal supplies could only be obtained at largely increased prices. The provision of suitable labour was also a matter of anxiety, and of increased cost. Under these circumstances, the Directors saw no alternative but to increase the price of gas as from Lady-day next. The increase, at present proposed, was only a small one—2d. per 1000 cubic feet; and it was hoped that this might be sufficient to enable the Company to meet the increased expenditure already being experienced.

Sevenoaks Water Company.—At the recent half-yearly meeting of the Sevenoaks Water Company, the Directors recommended the payment of dividends at the rates per annum of 9 per cent. on the consolidated stock, £6 6s. per cent. on the ordinary share capital, and 4 per cent. on the preference capital (all less income-tax), and the transfer of £105 to the depreciation fund, raising it to £1800. In moving the adoption of the report, the Chairman stated that at length the buildings, plant, and machinery at the Kemsing works had passed the construction and experimental stages, and were in full working order. The result was entirely satisfactory, and the Directors hoped in future years the Company would receive their due reward for the expenditure. Upwards of 86 million gallons of water were pumped last year, representing an average daily supply of nearly 236,000 gallons. The estimated population served was 11,600, giving an average daily supply of more than 20 gallons per head. The total number of supplies was 2554, which showed a slight increase over 1913. The cost of street watering and flushing had been reduced in the last two years from £188 to £116, due partly to the seasons, but probably more to road tarring. The report was adopted, and the dividends recommended were declared.

Heavy Parliamentary Costs at Leighton Buzzard.

The revenue account of the Leighton Buzzard Gas Company for 1914 showed a balance of £1956; and out of the balance of £2579 standing to the credit of the profit and loss account the Directors recommended the payment of dividends at the rate of 10 per cent. per annum on the original stock and 7 per cent. on the new ordinary stock (less income-tax), leaving a balance of £831 to be carried forward. Presiding at the meeting, Mr. R. Richmond said that as they had been passing through a period of considerable anxiety, he wished first of all to congratulate the Secretary and Manager (Mr. H. G. Ruggles) and the staff upon the successful working of the Company during the year. The unfortunate opposition to the Bill promoted last year had cost the Company about £1500 more than they would otherwise have had to spend on obtaining the Act; and there was in addition a sum of some £900 spent by the Urban District Council. This was a serious amount of money to take out of the town, and was a loss to the consumers and ratepayers, with no advantage. The Directors had used the suspense account for the payment of the greater part of the costs, and had charged the balance to the profit and loss account. The Act had put the Company under the sliding-scale; and the calorific value of the gas was now the standard of quality. The adoption of the sliding-scale, of course, precluded the payment of any more back-dividends; but the stockholders would have the advantage of a probable permanent increase of dividend, and a substantial increase in the capital value of the Company. Notwithstanding the reduction of 2d. per 1000 cubic feet in the price of gas for three-quarters of the year (a saving to the consumers of £400), the income from private sales was £100 more. The make of gas had increased 5½ per cent.; and there were now 2180 consumers. The present year's working might be looked forward to with confidence. A considerable difference to the output of gas had already been made by the troops stationed in the district. The report was adopted; and at a subsequent extraordinary meeting the Directors were authorized to issue further capital.

Rhyl Gas and Water Profits.—The good work that is being done at Rhyl has been acknowledged by the Urban District Council, who have decided to raise the salary of Mr. L. G. Hall (the Gas and Water Engineer) from £300 to £350 a year. It was pointed out that during the 22 years Mr. Hall has occupied his present position, the gas-works have made a profit of £1800 per annum; while last year the water-works made £1100 profit.

A Higher Price at Seaford.—An intimation has been received by the Urban District Council that, owing to the unforeseen rise in the price of coal, the Directors of the Seaford Gas Company are compelled to increase the price of gas on and after the March quarter readings by 4d. per 1000 cubic feet, making the charge to the ordinary customer 4s. 3d., less the usual discount. According to the agreement with the Council, the revised price to them will be 3s. 9¼d. per 1000 cubic feet.

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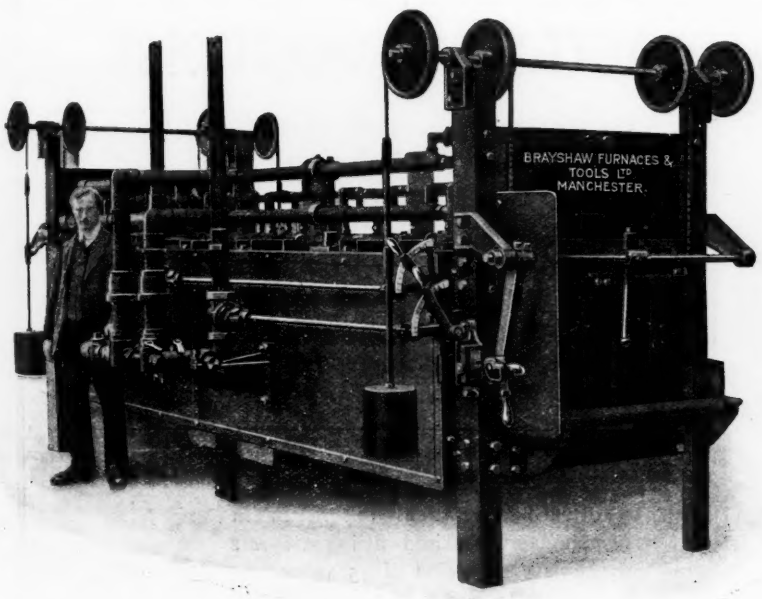

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Collision with a Gas Company's Barge.

At the Lambeth County Court, before Judge Parry, on Monday of last week, Edmund Prizeman, a local barge owner, brought an action to recover damages to a canal barge from the South Metropolitan Gas Company. Mr. A. T. Clements (for plaintiff) said the amount of damages had been arranged between the parties at £11 10s.; and the question for his Honour to decide was that of liability. On Nov. 19 last, a barge belonging to plaintiff had left the Surrey Commercial Docks, and was proceeding through the Grand Surrey Canal. Near the defendants' works was a string of barges; and when the plaintiff's barge was passing those of defendants, one of them—the "Linnet"—swung round into the centre of the canal, and came into collision with plaintiff's barge. The defendants' barges were only moored fore; whereas by Act of Parliament they should have been moored fore and aft. Evidence bearing out this statement having been given, George Case, a coal-filler in defendants' employment, said he was in another barge at the time when plaintiff's barge passed. The "Linnet" had been unloaded, and was made fast at both ends; the stern being fastened to an iron towing-post. When the plaintiff's barge was passing, it struck a timber barge on the opposite side of the canal, and swung round against the "Linnet." James Birmingham, in defendants' employment, stated that he securely fastened the "Linnet" after she was unloaded. Mr. Dumas (for the South Metropolitan Company) said the defendants did not wish their men blamed for an accident for which they were not responsible. Judge Parry said he was satisfied that the "Linnet" was not properly moored, and gave judgment for the plaintiff for the amount agreed upon, with costs.

Liverpool Water Supply.—The Water Committee have recommended the Liverpool City Council to authorize the preparation of a Bill for the session of 1915-16 to obtain powers to enable a further amount of water to be brought from Lake Vyrnwy. In a report on the subject, the Consulting Engineer (Mr. Joseph Parry) points out that the present demand amounts to 40 million gallons a day; and the annual increase to be provided for is, in round figures, a million gallons per day. The present resources being 46 million gallons per day, more water will be required in about six years, if not sooner. Works to convey the extra Vyrnwy water to Prescot would take three years to construct; but before preliminary plans could be prepared and estimates made for submission to Parliament, several important questions had to be settled. Chief among these was the diameter of the new pipes. In Mr. Parry's view, the works should be designed so as to bring to Liverpool about double the quantity of water which each of the two existing lines was capable of discharging. He anticipates some difficulty arising in connection with the crossing under the Mersey. When this matter was under discussion in the years 1887-8, two schemes were before the Committee—one for a tunnel to carry a single line of pipes, and one for a tunnel large enough to hold three lines. The Committee, unfortunately, in his opinion, agreed to a compromise, and adopted a scheme for two lines.

Coal Elevator Fatality at the Cleckheaton Gas-Works.

At the Bradford Town Hall, last Friday, the City Coroner (Mr. J. G. Hutchinson) concluded an adjourned inquiry into the circumstances attending the death of Amos Barlow (43), a gas stoker, which resulted from injuries received through falling into one of the coal elevators at the Cleckheaton Gas-Works on the 27th ult. The Coroner was accompanied by Mr. G. Alan Taylor, one of the Inspectors of Factories. Dr. Jackson, Resident Surgeon at the Bradford Royal Infirmary, described the injuries sustained by deceased, and expressed the opinion that death was due to shock. Mr. Arthur L. Jennings, the Engineer and Manager of the works, stated that the man's duties were to attend to the feeding of the conveyor with coal. He explained that the conveyor consisted of a number of buckets on an endless chain moving along a trench 4 ft. 6 in. wide and 2 ft. 7 in. deep, running the entire length of the shed—113 feet. In the course of his work it was necessary for Barlow to cross the trench from time to time. This could only be done by means of a fixed platform at one end, by a travelling platform, or by a footplate attached to the hopper. The footplate was 2 ft. 4 in. long and 1 ft. 5 in. wide. There was, however, a projection on the side of the hopper about 3 feet above the footplate which reduced the actual clear width of the latter to about 3 inches. The present construction of the plant was such that it would not permit of the trench being covered up. James Mulligan, a labourer employed at the gas-works, said he saw deceased crossing the trench on the footplate. He appeared to slip, fell into one of the buckets, and passed underneath the hopper feet first. Witness ran to the foreman, and the machinery was put out of gear. On returning he found that the bucket in which the man lay had passed round the machinery at the turn, and was about 15 feet above the level of the ground. He was still conscious when they came up. Job Wood, the works foreman, said he had himself crossed the trench scores of times by the footplate, but thought it would be much better if it was made wider. The Jury returned a verdict of "Accidental death;" and the Inspector intimated that it had already been arranged to widen the footplate and to provide handrails.

Brentwood Gas Company.—In their report for the past year, the Directors state that the revenue account shows a profit of £4116, to which has to be added the balance brought forward from last year (£1869) and interest on deposit account, making a total of £6011. After providing for interest and dividend on preference stock, there remains a balance of £4635. Interim dividends at the rate of 8 per cent. per annum on the original stock and 5⅝ per cent. per annum on the additional stock (both less income-tax) have been paid for the first six months of the year; and the Directors recommend the payment of final dividends at the rate of 12 per cent. per annum on the ordinary stock and 8⅜ per cent. per annum on the additional stock, making 10 and 7 per cent. respectively for the year. This will leave a balance of £940 to be carried forward.

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Richmond Gas Stove and Meter Company, Limited.

Mr. Thomas Dwerryhouse, presiding over the annual meeting of the above Company, held at Warrington last Thursday, said they were very glad to find out that, after a few weeks following the outbreak of the war, there was very little extra disturbance in the Company's affairs beyond the cancellation of a few small orders. About 300 men had left the Company's employment to join the Army. It was difficult to replace these men, and consequently their output had to a certain extent been reduced in regard to goods. The price of coal had risen considerably; and as many of the gas undertakings had given notice to increase the price of gas, it would possibly lead to a reduction in some of their manufactures, notably fires and cookers. In moving the adoption of the Directors' report and balance-sheet, the Chairman added that the latter was the best he had seen in connection with the Company. Mr. H. M. Thornton, in seconding, said their gas appliances were used in the preparation of armaments, transport vehicles, and in almost every part of the naval and military equipment. The Company were actively assisting in the production of many things made necessary by the war, and they hoped by so doing it would help to bring nearer the day when there would be a successful termination of hostilities. A dividend (free of income-tax) on the ordinary shares of 10 per cent. per annum, with a bonus of 6d. per share, was declared.

Carlisle Rural Water Supply.—A Local Government Board inquiry was recently held at Carlisle into the application of the Rural Council to borrow £59,000 for a water supply scheme for the district. Mr. Graham (the Engineer) explained the source of supply at Caldbeck, and said it was proposed to lay 73 miles of pipes. There was considerable opposition to the scheme by millowners, and by the Carlisle Corporation, who have an abundant gravitation supply, and already furnish water to a number of places in the area the Rural Council propose to embrace.

New Issues of Capital.—At the Mart, Tokenhouse Yard, E.C., last Tuesday, Messrs. A. & W. Richards placed two new issues of gas and water capital, by order of Directors. The first lots consisted of 4 per cent. consolidated preference stock of the Aldershot Gas, Water, and District Lighting Company; and they were all sold at £80 10s. to £81 15s. per £100 of stock. An issue of "C" consolidated stock of the Company, ranking for a maximum dividend of 5 per cent., and carrying this rate from the completion of the purchase, was placed at £90 5s. to £91. Some £10 non-cumulative preference shares (5 per cent.) in the Felixstowe and Walton Water Company were sold at £10 2s. 6d. to £10 7s. 6d. each.

Gas v. Electricity at Middleton.—At the last meeting of the Middleton Town Council, attention was drawn to a minute which stated that the Watch Committee had recommended the approval of a scheme for the electric lighting of a portion of the town. Alderman Townend (the Chairman of the Gas Committee), however, said he regretted the Committee had not had the courtesy extended to them of showing what they could do in lighting that part of the borough. The Watch Committee, he thought, ought to have come to the Gas Committee and asked what they could do towards the better lighting of the streets. Had they been beaten, they would have stood down. When the war was over, it was the intention of the Committee to proceed with certain schemes for the better lighting of the borough.

Fatality at an Electricity Works.—At an inquest in Manchester on the body of John H. Nevin, an electrical engineer, it was stated that deceased had had twelve years' experience of electrical engineering, and had been six months at the Corporation generating station at Stuart Street. He was in charge of work on a transformer in the engine-room; and after this was completed, and while the transformer was "dead," he mounted a ladder to a switch-board, forgetting apparently that this section of the board was "live." He touched it; and the current was so strong that he died from the shock. The Resident Engineer said he could only suggest that Nevin's act was done in a moment of forgetfulness. No precaution had been neglected by the Corporation. The medical evidence showed that contact had been made with the forefinger of the left hand. A verdict of "Accidental death" was returned.

Brixham Gas Company.—The annual meeting of the Brixham Gas Company was held last week, Mr. W. A. Schultz, the Chairman, presiding. It was stated in the report for the year ended Dec. 31 last that a profit of £1997 had been made on the gas-works; but the electricity side of the undertaking had yielded a profit of only £56. It was unfortunate that, in order to meet the persistent demand of the Urban District Council, the electricity supply was installed; for there was a very small response from consumers in Brixham. The action brought against the Company by Mr. S. C. Edwards, for an alleged nuisance in respect of vibration, was settled by the Company agreeing to remove the causes of vibration to the satisfaction of the plaintiff. The total costs of the action (£2297) had been charged against the profits of the Company; leaving £61 6s. 3d. to the credit of the profit and loss account. The Directors regretted that they could not, therefore, recommend a dividend for the past year. So far as gas was concerned, they had had a satisfactory year. The total quantity sold was 19,131,000 cubic feet, which produced a revenue of £3488, compared with £3354 in 1913. Meter-rentals and hire of stoves had produced rather less revenue, but the hire of prepayment fittings more, and there had been a falling off in the receipts from residuals. On the year's working there had been an increased revenue from gas of £64, whereas the expenses of management, &c., had increased by £51. In the electricity department they had a plant capable of turning out ten times the current actually demanded; and the increase in sales was only £17 over the previous year. The working of the gas department was very satisfactory. From every ton of coal they were producing 12,350 cubic feet of gas; the actual sales being 11,570 feet per ton—leaving only 4·8 per cent. unaccounted for. In the course of discussion on the report, it was stated that the price of gas was 4s. per 1000 cubic feet, and that an increase would probably have to be made in consequence of the greater cost of coal. The report was adopted.

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High Prices for Coke at Manchester.—The Manchester Corporation Gas Department announced on Saturday last that from yesterday (Monday) the price for the best coke at the Gaythorn, Rochdale Road, Droylsden, and Bradford Road stations would be £1 per ton. About Christmas the price of best coke averaged 14s. 2d. per ton; but since then the price has gradually advanced to 15s., 18s. 4d., and now 20s.

Gas Explosion at Coventry.—Consequent upon the moving of tables at the Coventry Liberal Club, to prepare for a whist-drive and dance, a gas-burner was dislodged, and an escape of gas took place owing to the tap not being turned off. A smell of gas led to a search for the leakage; and though windows were opened before a match was struck, an explosion occurred which inflicted rather serious injuries on the young man who caused it, who had to be removed to the hospital.

Candy Filters for Windsor.—The Water Committee of the Windsor Town Council have submitted a report prepared by Colonel W. R. Smith, M.D., F.R.S., Sanitary Officer of the Home Counties Division of the Territorial Forces and a Principal of the Royal Institute of Public Health, on the future treatment of the water supply, which, during the recent floods, became slightly polluted. Dr. Smith recommends that Candy filters, which are now in satisfactory use at Reading, should be installed at the water-works. The Town Council, being unanimous that some system of filtration is required, though at normal times the water is of the highest purity, have decided to instal five of the filters named.

Monte Video Water Supply.—The accounts of the Monte Video Water-Works Company, Limited, for the year 1914 show a disposable balance of £119,883. Out of this the Directors propose to pay a dividend making, with the interim dividend, 8 per cent. for the year, less income-tax, and to place £15,000 to the reserve fund, £5000 to the depreciation fund, and £2000 to the staff provident fund. This will leave £55,383 to be carried forward. In view of the rapid expansion of the Company's business in recent years, the Board have decided to increase the high-level storage installation at Las Piedras; and arrangements have been made for the construction of two more reservoirs there, which will practically double the existing capacity.

Leicester Gas Undertaking.—The accounts of the Leicester municipal gas undertaking for the half year ended Dec. 31 last show that, after paying interest on capital, there is a net profit of £8484. Deducting £8308, being the half-yearly allocation to the sinking fund and in part payment to the Public Works Loan Commissioners, a sum of £176 remains, which, added to £9104, being the balance of net profit for the half year ended June 30 last, makes a total of £9580 applicable to the district fund at the close of the financial year (March 31), or by which the Council may increase the reserve fund of £23,487, or appropriate a sum to be applicable for renewal of works. The Gas Committee recommend the Corporation to apply the £9580 to the district fund.

Road Damage by Heavy Motors.—In view of complaints as to damage caused to roads by heavy motors and locomotives, the President of the Local Government Board has appointed a small expert Committee to consider the law and regulations relating to the construction and use of road locomotives and heavy motor-cars in Great Britain, and to report what amendments (if any) are desirable. The Committee will consist of Mr. E. Shortt, M.P. (Chairman), Mr. A. G. G. Asher (Secretary of the Association of County Councils in Scotland), Mr. P. M. Crosthwaite (Local Government Board Engineering Inspector), Mr. H. H. Humphreys (Technical Adviser to the National Traction Users' and Manufacturers' Association), Mr. E. J. Lovegrove (Borough Surveyor of Hornsey), Mr. J. E. Thorneycroft (former Vice-President of the Society of Motor Manufacturers and Traders), and Mr. J. Willmot (County Surveyor of Warwickshire), with Mr. R. J. Simpson, of the Local Government Board, as Secretary.

Disley and Urban Powers.—At a largely-attended meeting of the ratepayers of Disley (near Stockport) last Thursday, it was decided not to seek urban powers, but to remain a rural district. Mr. Whitehouse, who championed the scheme for the conversion of the district into an urban area, stated, among other things, that if Disley possessed urban powers the ratepayers would have control over the gas supply, with the profits both at Furness Vale and Disley; urban powers would give to the ratepayers all the profits. Mr. E. N. Davenport, the Clerk, reminded the meeting that some years ago, when the question of the Council controlling the gas supply was gone into, it was a point whether the gas profits would counterbalance the loss on rates. Mr. Mather, who opposed the urban scheme, said it had been mentioned that if they had urban powers they could have made gas and sold it to the ratepayers. They would, perhaps, have made 1d. or 2d. in the pound profit; but the result would have been that, instead of paying 3s. 3d. per 1000 cubic feet to the local Gas Company (as they were at present doing), they would have been paying 5s. per 1000 cubic feet.

Gas Profits at South Molton.—A discussion took place at the meeting of the South Molton Town Council last Thursday on the question of applying £100 from the profits of the gas undertaking in relief of the rates. Mr. Howe protested against the decision of the Finance Committee to relieve the general body of the ratepayers at the expense of the gas consumers. First consideration should be given to those who created the fund on which it was proposed to draw. Probably the gas undertaking would have to bear a loss in the coming year, for there was a great advance in the price of coal, and the output of gas was less. When an adverse balance was disclosed the Council, he supposed, would raise the price of gas, move a vote of censure on the Gas Manager, and reduce his salary. The Mayor (Alderman W. Sanders) pointed out, as justification for the action of the Committee, that while the Council were paying the usual amount for public lighting, the consumption of gas for this purpose was reduced owing to the lighting having been cut down. Mr. J. Sanders remarked that South Molton gas consumers paid a lower price than any town of similar size in the West of England, and said that, in allocating a portion of the profits of the gas undertaking to the relief of the rates, they were following the example of Birmingham, Nottingham, Leeds, and Bradford. Mr. Howe said that did not affect his argument that it was bad finance. It was stated by other members that the course which was being taken prevented an increase of the rates by 4d. in the pound, and the majority of the Council adopted the recommendation of the Committee.

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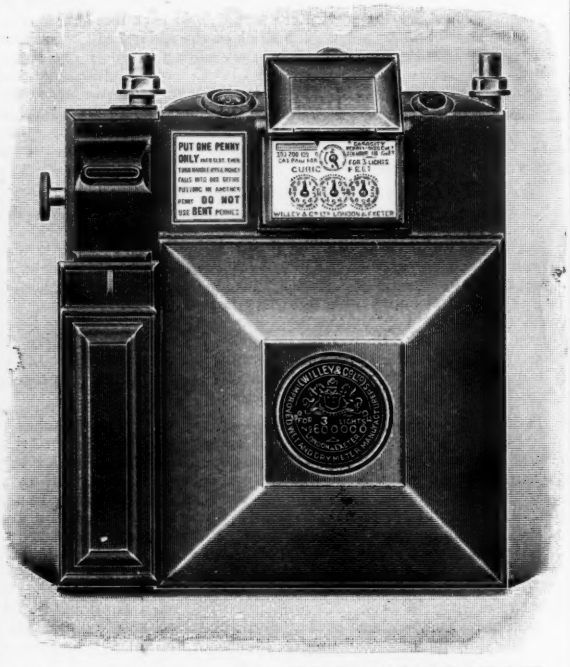

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Decreased Consumption at Heywood.—At a meeting of the Heywood Town Council last week, Alderman David Healey (the Chairman of the Gas Committee) stated that the total decreased consumption for the quarter ended January was 4¼ million cubic feet of gas. The total receipts amounted to £5822, as against £6387 odd, a decrease of £565. This would have an important effect on the finances of the undertaking. The decrease is attributed to the short time worked in the local mills and factories up to a recent date.

Martock and District Gas Consumers' Company, Limited.—The report of the Directors for the year ended Dec. 31 states that, notwithstanding the reduction in the price of gas from April 1 last, amounting to £140, the profit on the year's working (after charging to revenue all renewals, repairs, maintenance, and depreciation) amounts to £1164, and the balance of profit and loss account available for dividend (including the balance brought forward) is £2051. The Directors recommend the full dividend of 4½ per cent. on the preference shares and a dividend of 5½ per cent. on the ordinary shares, absorbing £481; that the sum of £100 be debited to profit and loss account and written off expenditure on capital account; that the sum of £200 be taken to the reserve fund account; and that the balance of £1270 be carried to the next account. There has been an increase of nearly 16 per cent. in the sale of gas.

The report of the Directors of Messrs. Fletcher, Russell, and Co. for last year states that the profit and loss account, after charging depreciation, debenture interest, trustees' and Directors' fees, shows a profit of £15,406, to which is added the balance brought forward from last year of £4282, making a total of £19,688, out of which the preference dividend for the half year ended June 30, 1914, of £1500 has been paid, leaving a balance of £18,188. The Directors recommend that a final dividend on the preference shares for the six months ended Dec. 31 be paid; and that a dividend of 5 per cent. be paid on the ordinary shares for the year, absorbing £5000. They also recommend the payment of a bonus of 2½ per cent. for the year on the ordinary shares, absorbing £2500; and the transfer to the reserve fund of the sum of £3703. There will be left to carry forward £5485.

The Wombwell Urban District Council have accepted, subject to the approval of the Local Government Board, the tender of Messrs. Goodall, Clayton, and Co., of Hunslet, Leeds, for the supply and erection of new carbonizing plant, at the sum of £12,605.

The members of the Clerks' Association of the Gas Distribution Department, Glasgow, held their annual social and dance in the Burlington House, Bath Street, last Friday evening, when about forty couples were present. A very enjoyable evening was spent in dancing and music.

The Directors of Messrs. Glover and Main, Limited, have declared dividends for the six months ended Dec. 31 at the rate of 5 per cent. per annum (making with the interim dividend paid 5 per cent. for the year) upon £50,000 of preference share capital, and at the rate of 11 per cent. per annum (making with the interim dividend paid 7½ per cent. for the year) upon £200,000 of ordinary share capital.

A boy named Preece, eight years old, was killed as a result of contact with wires at the power station of the South Wales Electrical Distribution Company. A friend who was with deceased said he climbed on to the roof of the power station (which was quite easy to do), and with both hands caught hold of the bare overhead wires. The Coroner's Jury, in returning a verdict of "Death from misadventure," added a rider to the effect that the Company should protect the spot.

The report to be submitted at the annual meeting to-morrow of the Davis Gas-Stove Company states that the net profits for the year ended Dec. 31 amount to £20,357, to which must be added the amount brought forward from 1913 (£5548), giving a total divisible profit of £25,905. Deducting from this the dividend on the 5½ per cent. preference shares for the year, amounting to £3173, and the interim dividend on the ordinary shares at the rate of 5 per cent. per annum for the half year to June 30, amounting to £1468 (in all £4641), there remains a balance of £21,264. It is proposed to distribute £4300 in paying a dividend on the ordinary shares at the rate of 15 per cent. per annum for the half year ended Dec. 31, making 10 per cent. for the year (less income-tax), to place £6500 to a properties reserve account, and to contribute £1500 to the provident fund; and, after providing £1261 for the proportion of profits payable to the Directors, there will remain £7703 to carry forward.

GAS COMPANIES IN THE STOCK EXCHANGE.

The Stock Exchange made yet a further improvement last week. The volume of bargains effected showed an advance on the maximum hitherto attained on any one day; while the cheerfulness of the tone rose perceptibly. Several markets consolidated their position. The War Loan commanded higher figures; and this—coupled with the success of the Queensland 4½ per cent. loan, which was over-subscribed—tended to put some backbone into the gilt-edged division. Home Rails advanced, though the question of the increase in wages conceded by the Government has yet to be settled with them; and the Oil Market was firm. But munitions and warlike material paused to consider what the upshot of the new Defence of the Realm Act might be. Internally, no little unrest is still rife on the Stock Exchange regarding minimum prices, which are declared to operate detrimentally in more ways than one, and much interest is manifested in the forthcoming Committee election. The Gas Market did not participate in the increase of business which flowed in other departments—indeed, its week's aggregate was a good bit below recent averages. Prices, however, did not seem to suffer.

Bargains done for cash during the week were as follows: On Monday, Cape Town preference 3 11/16, Commercial 4 per cent. 99, Union 70, 70⅜, Gas Light ordinary 91¼, 91⅜, Primitiva 4½, 4 11/16, ditto preference 4½, 4 9/16, San Paulo preference 9¼, South Metropolitan 97½, 98. On Tuesday, Aldershot preference 85⅜, 86, Cape Town preference 3 11/16, Union 70, 70⅜, Gas Light ordinary 91¼, 91½, 91⅜, 92, ditto preference 91¼, 91⅝, Imperial Continental 83, Primitiva 4 11/16. On Wednesday, Gas Light ordinary 91, 91⅛, ditto maximum 71½, Imperial Continental debenture 79½, South Metropolitan 97, 97½, 98. On Thursday, British 41¼, Gas Light ordinary 91, 91⅛, 91⅜, ditto preference 91⅛, ditto debenture 71, Newcastle 92½, Primitiva preference 4 9/16. On Friday, British 41, 41¼, Gas Light ordinary 91, 91¼, 91½, 91⅜, South Metropolitan 96, 97, 97½, 98, Liverpool 5 per cent. 100½. On Saturday, Gas Light ordinary 91, 91⅜. In the Money Market, short loans were easy, and discount rates were fairly steady until Friday, when a sharp rise in the latter took place.

Bank rate (fixed Aug. 8) 5 per cent.; last year, 3 per cent.

LOWEST AND HIGHEST PRICES OF BARGAINS DONE FOR CASH IN THE WEEK ENDING MARCH 13.

Issue.	Share.	When ex. Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices. July 30.	Yield on Highest Closing Price.	Lowest and Highest Prices of Bargains.
£			p.c.		£ s. d.		
1,551,868	Stk.	April 8	2½	Alliance & Dublin Ord.	59 –64	3 18 2	..
374,000	,,	July 10	4	Do. 4 p.c. Deb.	76–79	5 1 3	..
280,000	5	April 29	7½	Bombay, Ltd.	5¼–6⅜	5 17 8	..
50,030	10	Feb. 26	16	Bournemouth Gas and Water: 10 p.c.	29–30	5 6 8	..
378,480	10	,,	7	Bournemouth Gas and Water: B 7 p.c.	15–15½	4 10 4	..
95,000	10	,,	6	Bournemouth Gas and Water: Pref. 6 p.c.	13½–14	4 5 9	..
—	—	—	—	Bournemouth Gas and Water: Deb.	..	—	..
880,000	Stk.	Feb. 26	14	Brentford Consolidated	261–266	5 5 3	..
330,000	,,	,,	11	Do. New	204–209	5 5 3	..
50,000	,,	,,	5	Do. 5 p.c. Pref.	109–111	4 10 1	..
206,250	,,	June 11	4	Do. 4 p.c. Deb.	91–93	4 6 0	..
217,380	Stk.	Feb. 26	11	Brighton & Hove Orig.	208–213	5 3 4	..
244,200	,,	,,	8	Do. A Ord. Stk.	154–159	5 0 8	..
530,000	20	Mar. 26	12½	British	44–45	5 11 1	41–41½
120,000	Stk.	June 26	4	Do. 4 p.c. Deb. Stk.	88–90	4 8 11	..
245,771	Stk.	June 26	4	Buenos Ayres 4 p.c. Deb.	85–87	4 12 0	..
100,000	10	—	—	Cape Town & Dis., Ltd.	1½–2½	—	..
100,000	10	—	—	Do. 4½ p.c. Pref.	4–6	—	3½
100,000	Stk.	June 26	4½	Do. 4½ p.c. Deb. Stk.	70–75	6 0 0	..
157,150	Stk.	Feb. 26	5	Chester 5 p.c. Ord.	103–110	4 10 11	..
1,513,280	Stk.	Feb. 12	5/9/4	Commercial 4 p.c. Stk.	106–108	5 1 2	99
560,000	,,	,,	5½	Do. 3½ p.c. do.	103–105	5 1 6	..
475,000	,,	June 11	8	Do. 3 p.c. Deb. Stk.	69½–71½	4 3 11	..
800 000	Stk.	,,	4	Continental Union, Ltd.	76–79	5 1 3	70–70⅜
200 000	,,	,,	7	Do. 7 p.c. Pref.	115–118	5 18 8	..
—	—	—	—	Croydon B and C 7 p.c.	..	—	..
492,270	Stk.	—	6	Derby Con. Stk.	123–125	4 16 0	..
55,000	,,	—	4	Do. Deb. Stk.	102–104	3 16 11	..
1,002,180	10	July 29	10	European, Ltd.	17½–18	5 11 1	..
16,362,910	Stk.	Feb. 12	1/17/4	Gas Light and Coke: 4 p.c. Ord.	98–102	4 15 6	91–92
2,600,000	,,	,,	8½	Gas Light and Coke: 8½ p.c. max.	76–79	4 8 7	71½
4,062,235	,,	,,	4	Gas Light and Coke: 4 p.c. Con. Pref.	96–99	4 0 10	91½–91⅝
4,674,850	,,	June 11	8	Coke 8 p.c. Con. Deb.	72½–74½	4 0 6	71
258,740	Stk.	Mar. 12	5	Hastings & St. L. 3½ p.c.	87–89	5 12 4	..
70,000	10	April 29	11	Hongkong & China, Ltd.	16½–16⅝	6 11 4	..
—	—	—	—	Hornsey 7 p.c.	..	—	..
131,000	Stk.	Mar. 12	7⅞†	Ilford A and C	151–154	5 2 4	..
65,780	,,	,,	6⅝†	Do. B	115–118	5 8 0	..
65,500	,,	June 26	4	Do. 4 p.c. Deb.	92–94	4 5 1	..
4,940,000	Stk.	May 14	9	Imperial Continental	150–160	5 12 6	83
1,235,000	Stk.	Feb. 12	8½	Do. 3½ p.c. Deb. Red.	84–86	4 1 5	79½
200,242	Stk.	Mar. 12	6½	Lea Bridge Ord. 5 p.c.	119–121	5 7 6	..
561,000	Stk.	Feb. 26	10	Liverpool 5 p.c. Ord. A	111–213	4 13 11	100½
718,100	,,	,,	7	Liverpool 5 p.c. Ord. B	116–118	1 14 7	
306,083	,,	June 26	4	Do. 4 p.c. Pr. Deb. Stk.	..	—	..

Issue.	Share.	When ex. Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices. July 30.	Yield on Highest Closing Price.	Lowest and Highest Prices of Bargains.
£			p.c.		£ s. d.		
75,000	5	June 11	6	Malta & Mediterranean	4½–4⅝	6 9 9	..
250,000	100	April 1	4½	Met. of Melbourne 4½ p.c. Deb.	99–101	4 9 1	..
541,920	20	May 28	4	Monte Video, Ltd.	11½–12	6 13 4	..
1,775,892	Stk.	July 29	4½	Newc'tle&G'tesh'd Con.	93½–99½	4 10 6	92½
529,705	Stk.	June 26	3½	Do. 3½ p.c. Deb.	82–83	4 4 10	..
55,940	10	Feb. 26	7/14/0	North Middlesex 7 p.c.	14–15	5 2 8	..
300,000	Stk.	May 14	8	Oriental, Ltd.	117–122	6 11 2	..
60,000	5	Mar. 26	10	Ottoman, Ltd.	7½–7⅝	6 9 0	..
60,000	50	Feb. 26	18	Portsea, Island B	128–131	4 19 8	..
100,000	50	,,	12	Do. C	118–121	4 19 2	..
249,980	5	April 29	8	Primitiva Ord.	5½–6	6 13 4	4½–4 11/16
499,960	5	June 26	5	,, 5 p.c. Pref.	4⅝–5	5 0 0	4½–4 9/16
521,600	100	June 2	4	,, 4 p.c. Deb.	91–93	4 6 0	..
—	—	—	—	,, ,, ,, 1911	..	—	..
846,198	Stk.	June 26	4	River Plate 4 p.c. Deb.	85–87	4 12 0	..
150,000	10	May 14	6	San Paulo 6 p.c. Pref.	10½–11	5 9 1	9¼
125,000	50	July 1	5	San Paulo 5 p.c. Deb.	47–49	5 2 0	..
135,000	Stk.	Mar. 12	10	Sheffield A	223–224	4 9 3	..
209,984	,,	,,	10	Do. B	222–224	4 9 3	..
523,500	,,	,,	10	Do. C	220–222	4 10 1	..
90,000	10	May 28	9	South African	10½–11½	7 16 6	..
6,429,895	Stk.	Feb. 12	5/9/4	South Met., 4 p.c. Ord.	111–113	4 16 8	96–98
1,895,445	,,	July 10	3	Do. 3 p.c. Deb.	72½–74½	4 0 6	..
209,820	Stk.	Feb. 26	8½	South Shields Con. Stk.	157–159	5 6 11	..
952,795	Stk.	Feb. 26	6	S'th Suburb'n Ord. 5 p.c.	114–116	5 3 5	..
60,000	,,	,,	5	Do. 5 p.c. Pref.	110–112	4 9 3	..
—	—	—	—	Do. West Kent.	..	—	..
137,058	,,	June 26	5	Do. 5 p.c. Deb. Stk.	116–118	4 4 9	..
629,740	Stk.	May 14	5	Southampton Ord.	99–102	4 18 0	..
120,000	Stk.	Feb. 12	7½†	Tottenham and District: A 5 p.c.	135–138	5 8 8	..
742,275	,,	,,	6†	Tottenham and District: B 3½ p.c.	115–117	5 2 7	..
181,255	,,	June 26	4	Tottenham and District: 4 p.c. Deb.	87–89	4 9 11	..
182,380	10	Dec. 30	5	Tuscan, Ltd.	5–6	8 6 8	..
149,900	10	July 1	5	Do. 5 p.c. Deb. Red.	93–95	5 5 3	..
236,476	Stk.	Mar. 12	5	Tynemouth, 5 p.c. max.	103½–109½	4 11 4	..
30,000	Stk.	Feb. 26	8⅜	Wandsworth, Wimbledon, and Epsom—Wandsworth A 5 p.c.	151–156	5 7 4	..
255,636	,,	,,	6⅜	,, B 3½ p.c.	129–134	5 2 7	..
108,075	,,	,,	5/17/8	,, C 3½ p.c.	110–115	5 2 0	..
352,000	,,	,,	6¼	Wimbledon 5 p.c.	117–122	5 0 5	..
98,000	,,	,,	6⅜	Epsom 5 p.c.	121–126	5 5 3	..
88,416	,,	June 26	3	3 p.c. Deb. Stk.	66–69	4 6 11	..

x Bargains marked thus were "Ex Div."

WANTED, FOR SALE, CONTRACTS, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Appointments, &c., Vacant.

ENGINEER AND MANAGER. Bury St. Edmunds Gas Company. Applications by March 26.
DRAUGHTSMAN. West's Gas Improvement Company, Manchester.
DRAUGHTSMAN. No. 6006.
JUNIOR CHEMIST. Birmingham Gas Department.
TRAVELLERS. No. 6004.
STOKER (LEADING HAND). No. 207, c/o Messrs. White and Son, 33, Fleet Street, E.C.

Pupil Wanted. No. 6005.

Plant, &c. (Second-Hand), Wanted.

GASHOLDER. J. W. Robertson, 20, Alva Street, Edinburgh.

Sales of Stocks and Shares.

CROYDON GAS COMPANY. Tenders by March 23.
GREAT GRIMSBY GAS COMPANY. Tenders by March 31.
ILFORD GAS COMPANY. London Mart. March 23.
SOUTHGATE GAS COMPANY. London Mart. March 23.
TENDRING HUNDRED WATER COMPANY. London Mart. March 23.
WANDSWORTH, WIMBLEDON, AND EPSOM GAS COMPANY. London Mart. March 23.

Meeting.

BRITISH GAS LIGHT COMPANY, 11, George Yard, Lombard Street, E.C. March 31. Twelve o'clock.

TENDERS FOR

Buildings (For Carbonizing Plant, &c.).

ASHINGTON URBAN DISTRICT COUNCIL. Tenders by April 17.

Carbonizing Plant.

ASHINGTON URBAN DISTRICT COUNCIL. Tenders by April 17.

Coal.

DENBIGH GAS COMPANY. Tenders by March 30.
WREXHAM GAS COMPANY. Tenders by April 7.

Condensing, Washing, Purifying, Exhausting, &c., Plant.

ASHINGTON URBAN DISTRICT COUNCIL. Tenders by April 17.

Gasholder, Tank, and Liquor Tanks.

ASHINGTON URBAN DISTRICT COUNCIL. Tenders by April 17.

Mains, Governors, Valves, &c., for High and Low Pressure.

ASHINGTON URBAN DISTRICT COUNCIL. Tenders by April 17.

Meters (Station, Ordinary, and Prepayment).

ASHINGTON URBAN DISTRICT COUNCIL. Tenders by April 17.

Sulphate Plant.

ASHINGTON URBAN DISTRICT COUNCIL. Tenders by April 17.

Tar and Liquor.

HAWORTH URBAN DISTRICT COUNCIL. Tenders by March 22.
MARPLE GAS DEPARTMENT. Tenders by April 23.

Tar-Extractors, &c.

ASHINGTON URBAN DISTRICT COUNCIL. Tenders by April 17.
HARROGATE GAS COPMANY. Tenders by April 9.

Weighbridge.

ASHINGTON URBAN DISTRICT COUNCIL. Tenders by April 17.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

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Orders for Alterations in, or stoppages of, PERMANENT ADVERTISEMENTS should be received by the FIRST POST on SATURDAY.

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